Boeing
B777–200/300

ATA 00..20
Introduction

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Training Manual

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- The date given in the column "Revision" on the face of this cover is binding for the complete Training Manual.
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- The LTT production process ensures that the Training Manual contains a complete set of all necessary pages in the latest finalized revision.

ATA 00 INTRODUCTION

00−00 AIRCRAFT GENERAL DESCRIPTION

BOEING B777 AIRCRAFT INTRODUCTION

The B777 is designed for ETOPS (extended range operations with two-engine airplanes). It is for medium and Long range flights. The 777 size is between a 767-300 and a 747-400.

777−200/-200ER Airplane

The 777−200 is a twin−engine airplane designed for medium to long range flights. It is powered by advanced high bypass ratio engines. Characteristics unique to the 777 include:

- Two−crew cockpit with digital avionics
- Circular cross−section
- Lightweight aluminum and composite alloys
- Structural carbon brakes
- Six−wheel main landing gears
- Main gear aft axle steering
- High bypass ratio engines
- Fly−by−wire system

777−200LR Airplane

The 777−200LR is a derivative of the 777−200 airplane and is equipped with raked wingtips to provide additional cruise altitude and range. It is powered by high bypass ratio engines that develop higher thrusts than those used in the 777−200/−200ER airplanes. The 777−200LR has an identical fuselage as the 777−200/−200ER but has a wider wingspan due to raked wingtips.

777−300 Airplane

The 777−300 is a second−generation derivative of the 777−200. Two body sections are added to the fuselage to provide additional passenger seating and cargo capacity.

777−300ER Airplane

The 777−300ER is a derivative of the 777−300 airplane and is equipped with raked wingtips for additional cruise altitude and range. It is powered by high bypass ratio engines that develop higher thrusts than those used in the 777−200/−200ER/−300 airplanes. The 777−300ER has an identical fuselage as the 777−300, but has a wider wingspan due to the raked wingtips.

777−Freighter Airplane

The 777 Freighter, newest member of the 777 Family of airplanes, is based on the 777−200LR Worldliner (Longer Range) passenger airplane. The 777 Freighter will fly farther than any other freighter, providing more capacity than any other twin−engine freighter, and will meet QC2 noise standards for maximum accessibility to noise−sensitive airports. The 777 Freighter will share the 777 Family‘s advanced features of a state−of−the−art flight deck, fly−by−wire design and an advanced wing design, including raked wing tips. The 777 Freighter will be powered by the world‘s most powerful commercial jet engine, General Electric‘s GE190−110B1L.

The 777 Freighter is designed to integrate smoothly with existing cargo operations and facilitate interlining with 747 freighter fleets. Cargo operators will be able to easily transfer 10−foot−high pallets between the two models via the large main deck cargo door.

Figure 1 General – Introduction

Aircraft Characteristics

	777–200		777–200ER		777–300		777–300ER	
	(lb)	(kg)	(lb)	(kg)	(lb)	(kg)	(lb)	(kg)
Maximum Take-off Weight (MTOW)	545 000	247 200	656 000	297 550	660 000	299 370	775 000	351 530
Maximum Landing Weight (MLW)	441 000	200 050	460 000	208 700	490 000	210 000	554 000	251 290
Maximum Usable Fuel (@ 6.75 lbs/US gallon) (ltr.)	207 700 117 300	94 240	302 270 171 100	137 460	302 270 171 100	137 460	320 863 181 283	145 538
Maximum Payload	121 100	54 920	125 550	56 940	141 093	64 000	154 000	69 853
Maximum Cruise Speed	Mach 0.84				Mach 0.84			
Max Range	5 235 nm (9 695 km)		7 700 nm (14 260 km)		6 015 nm (11 135 km)		7 9306 nm (14 685 km)	
Maximum 3–class passenger configuration	305		301		368		365	
Cargo (Total volume)	5 330 cu ft (151 cu m)				5 330 cu ft (151 cu m)		7 120 cu ft (202 cu m)	
Engines / Max Thrust								
General Electric GE90	77 000 lb (GE90–77B)		93 700 lb (GE90–94B)		93 700 lb (GE90–94B)		115 300 lb (GE90–115B)	
Pratt & Whitney 4000	77 000 lb (PW4077)		90 000 lb (PW4090)		98 000 lb (PW4098)		N/A	
Rolls-Royce Trent 800	76 000 lb (TRENT877)		93 400 lb (TRENT895)		92 000 lb (TRENT892)		N/A	

Figure 2 B777 Characteristics Comparison (1/2)

Aircraft Characteristics

	777–200LR (Worldliner)		777–Freighter		
	(lb)	(kg)	(lb)	(kg)	
Maximum Take-off Weight (MTOW)	766 000	347 450	766 800	347 810	
Maximum Landing Weight (MLW)	492 000	223 168	575 000	260 810	
Maximum Usable Fuel (@ 6.75 lbs/US gallon) (ltr.)	320 863 181 283	145 538	320 863 181 283	145 538	
Maximum Payload	141 000	63 957	141 000	63 957	
Maximum Cruise Speed	Mach 0.84				
Max Range	9 380 nm (17 370 km)		7 880 nm (14 594 km)		
Maximum 3–class passenger configuration	301		N/A		
Cargo (Total volume)	5 330 cu ft (151 cu m)		22 371 cu ft (634 cu m)		
Engines / Max Thrust					
General Electric GE90	110 100 lb (GE90–110B1)		110 100 lb (GE90–110B1)		
Pratt & Whitney 4000	N/A		N/A		
Rolls-Royce Trent 800	N/A		N/A		

Figure 3 B777 Characteristics Comparison (2/2)

FLIGHT DECK GENERAL INTRODUCTION

FLIGHT DECK MAJOR PANEL

These are the major panels in the flight deck:

- P 1 left forward panel
- P 2 center forward panel
- P 3 right forward panel
- P 5 overhead panel
- P 7 glareshield panel
- P 8 aft aisle stand panel
- P 9 forward aisle stand panel
- P 10 control stand
- P 11 overhead circuit breaker panel
- P 13 left sidewall panel
- P 14 right sidewall panel
- P 18 MAT/second observer panel
- P 55 glareshield center panel
- P 61 overhead maintenance panel.

MAIN INSTRUMENT PANELS P1 and P3

The main instrument panels (P1 and P3) have these displays and controls:

- Display units (4)
- Instrument source select panels (2)
- Clocks (2)
- Inboard display selectors (2)
- FMC selector
- Heading reference switch
- Brake accumulator pressure indicator.

GLARESHIELD PANELS P7 and P55

The glareshield panels have these controls:

- Master warning and caution lights (2)
- Master warning and caution reset switches (2)
- Mode control panel
- EFIS control panels (2)
- Display select panel
- Data uplink switches (2)
- Map light controls (2)
- MIC switches (2)
- Clock switches (2).

P2 CENTER FORWARD AND P9 FORWARD AISLE STAND PANELS

The P2 center forward and P9 forward aisle stand panels have these controls:

- Standby instruments (3)
- Display units (2)
- Ground proximity light and override switches
- Landing gear lever
- Autobrake selector
- Control display units (2)
- Center panel brightness control
- EICAS event record switch
- Center display control source switch.

Note that the lower center display unit is reversed (top to bottom) from the other five display units.

P10 CONTROL STAND

The P10 control stand has these controls and indications:

- Speedbrake lever
- Thrust levers (2)
- Stabilizer position indicators (2)
- Alternate flaps arm switch
- Alternate flaps selector
- Fuel control switches (2)
- Stabilizer cutout switches (2)
- Parking brake lever
- Alternate pitch trim levers
- Cursor control devices (2)
- Flap lever.

P61 OVERHEAD MAINTENANCE PANEL

The P61 overhead maintenance panel has control functions used normally only by maintenance personnel. The P61 overhead maintenance panel has these controls:

- Backup window heat switches
- Standby power switch
- Flight control shutoff switches
- APU and EEC maintenance panel
- Cargo temperature select panel
- Ground test switch
- Cockpit voice recorder panel.

The P61 panel also has the card files which contain the multiplexers for the overhead panel ARINC 629 system (OPAS).

P13 AND P14 SIDEWALL PANELS

The sidewall panels have these controls:

- Shoulder heater (2)
- Foot heater (2)
- Outboard display brightness (2)
- Inboard display weather radar (2)
- Panel flood light (2).

P18 MAT/SECOND OBSERVER PANEL

The MAT/second observer panel has these maintenance access terminal (MAT) items:

- MAT display
- MAT disk drive
- MAT cursor control device (CCD)
- MAT keyboard
- Portable MAT (PMAT) receptacle.

The panel also has these second observer controls:

- Map light control
- Headphone jack.

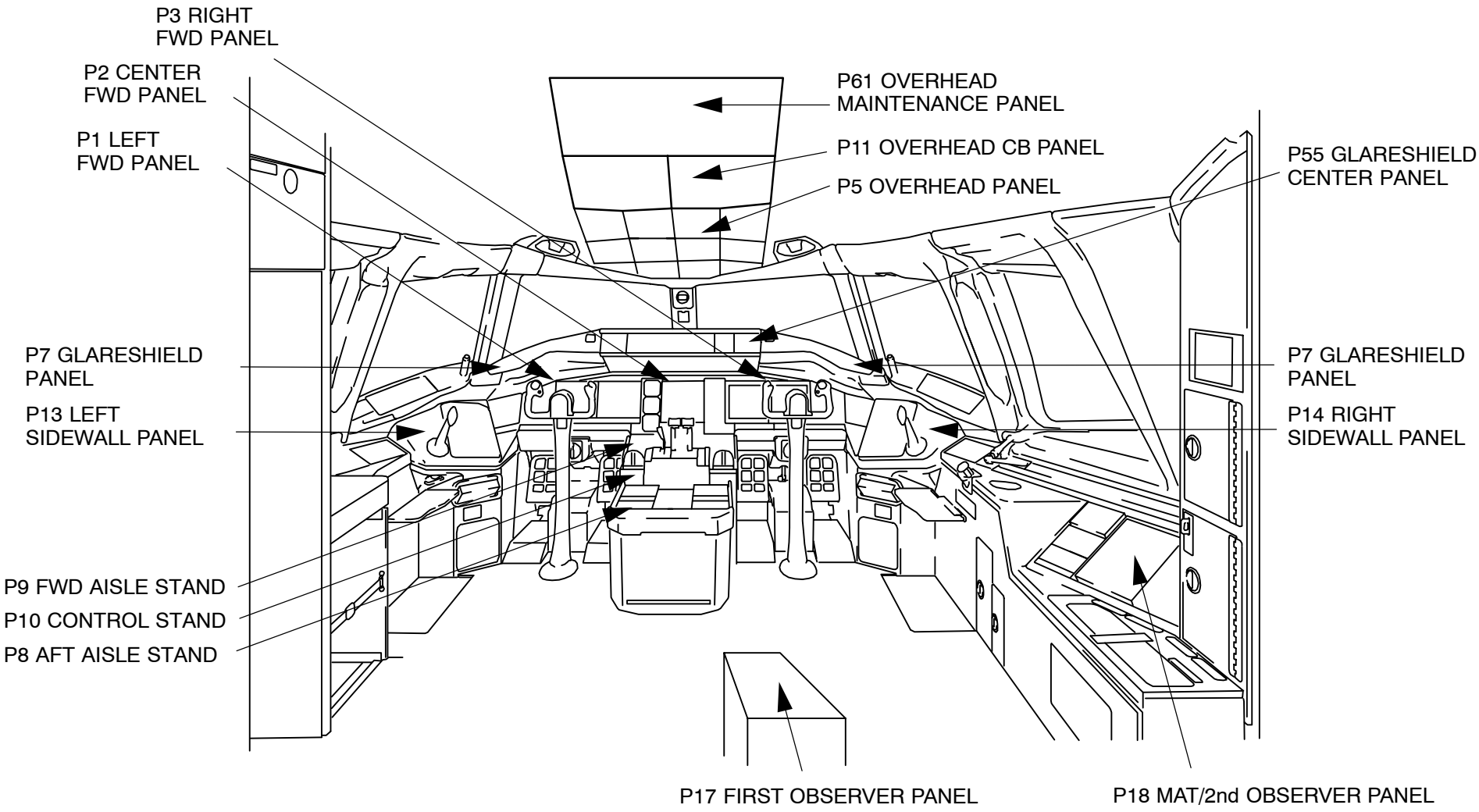


Figure 4 Flight Deck

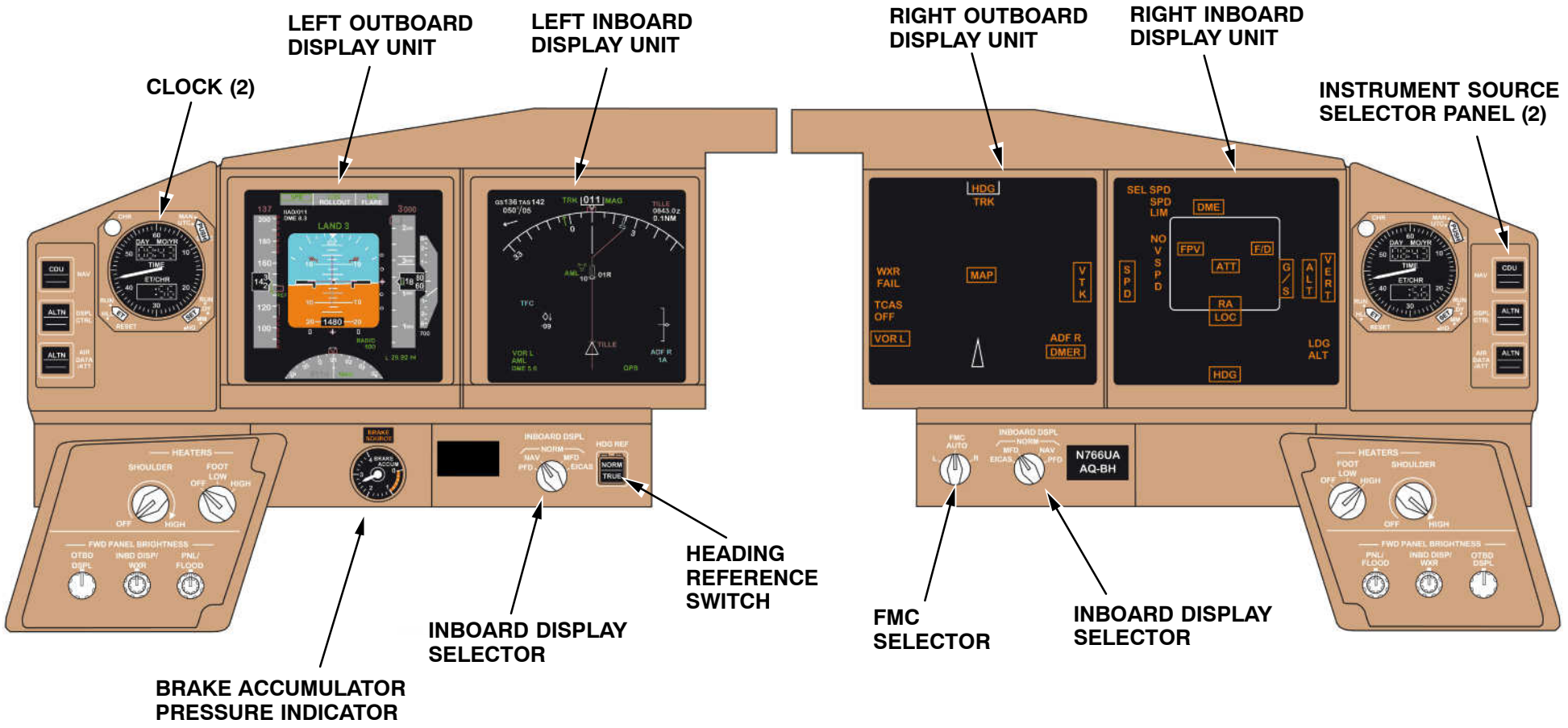


Figure 5 Main Instrument Panels

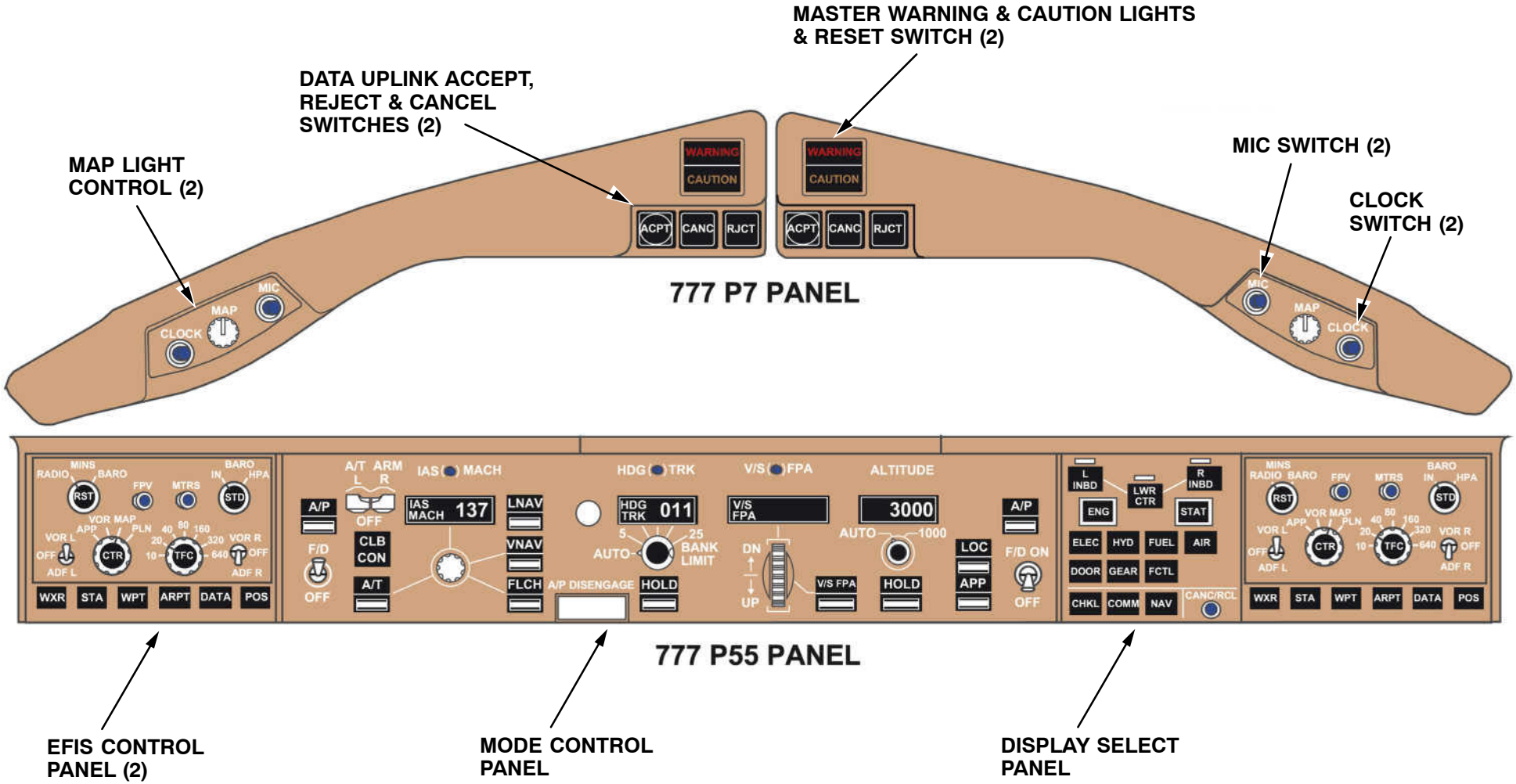


Figure 6 Glareshield Panels

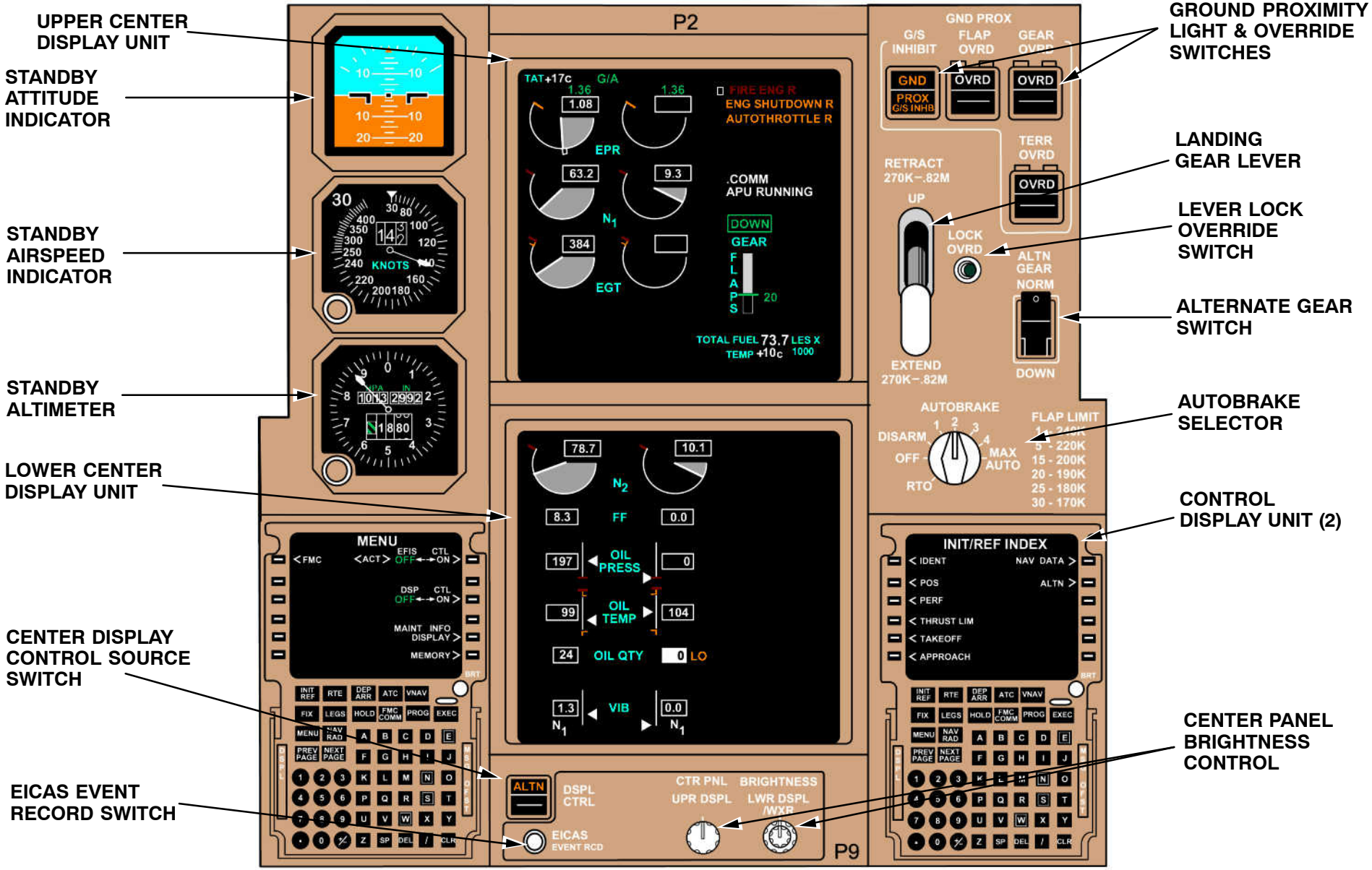


Figure 7 P2 Center Forward and P9 Forward Aisle Stand Panel

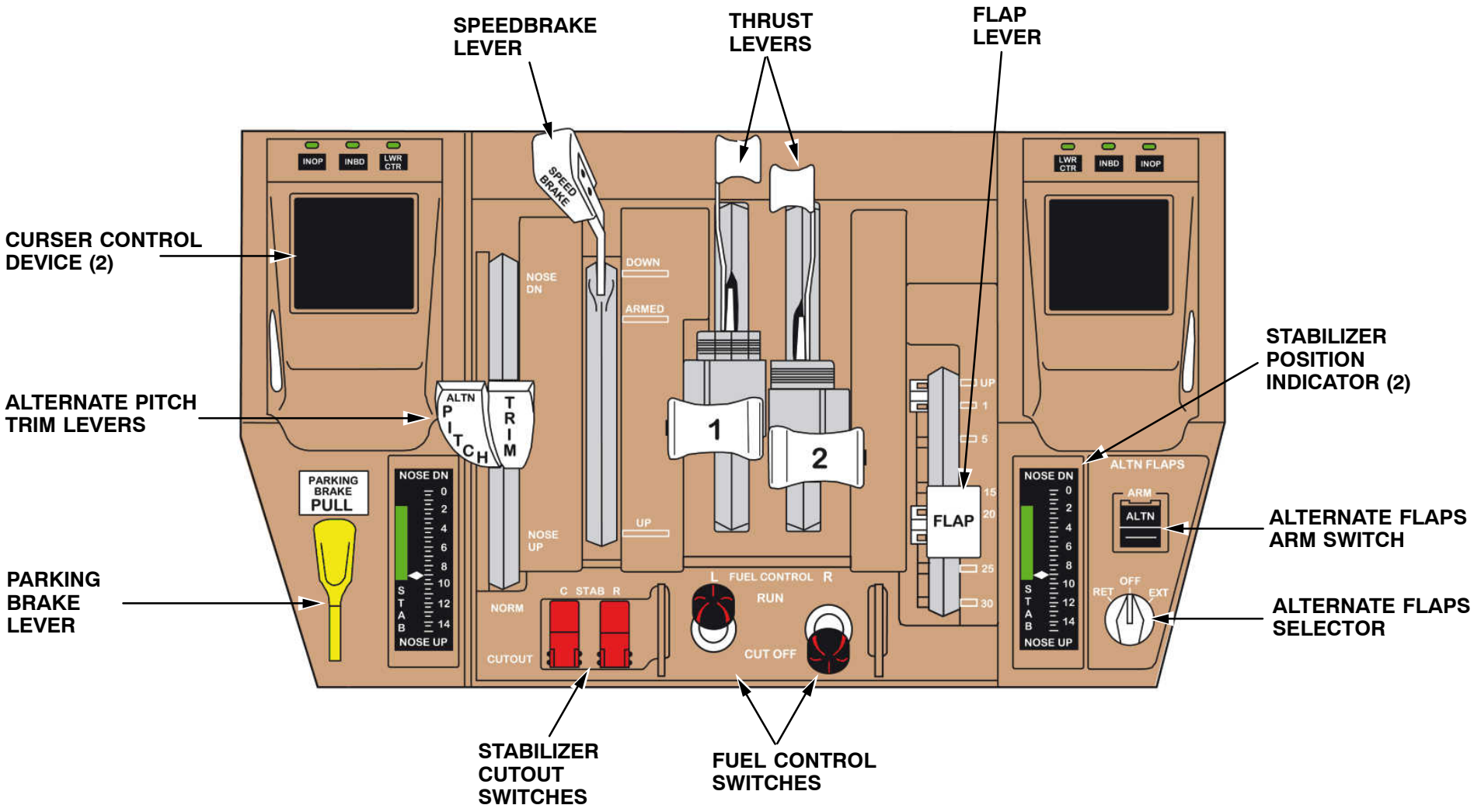


Figure 8 P10 Control Stand

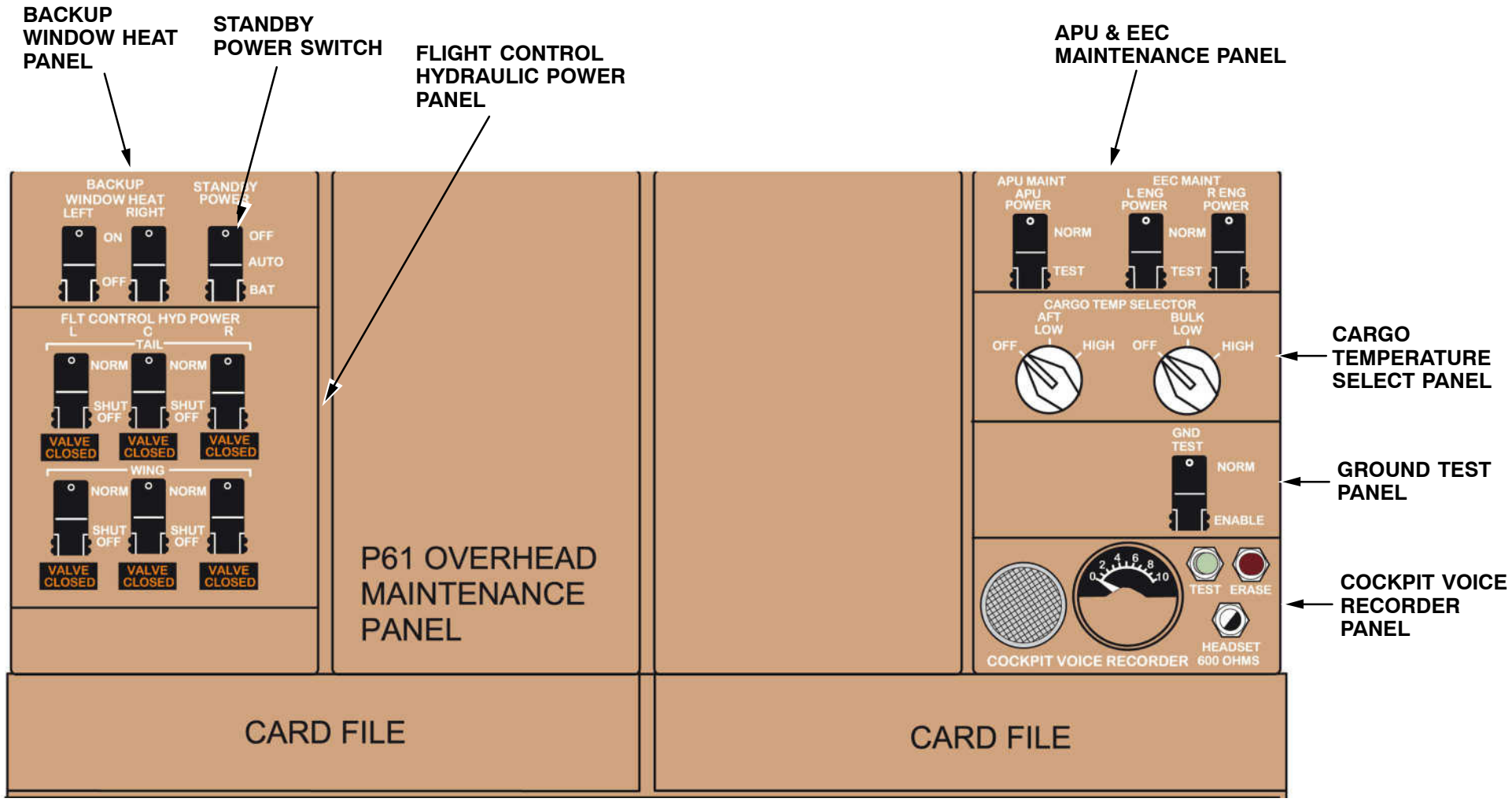
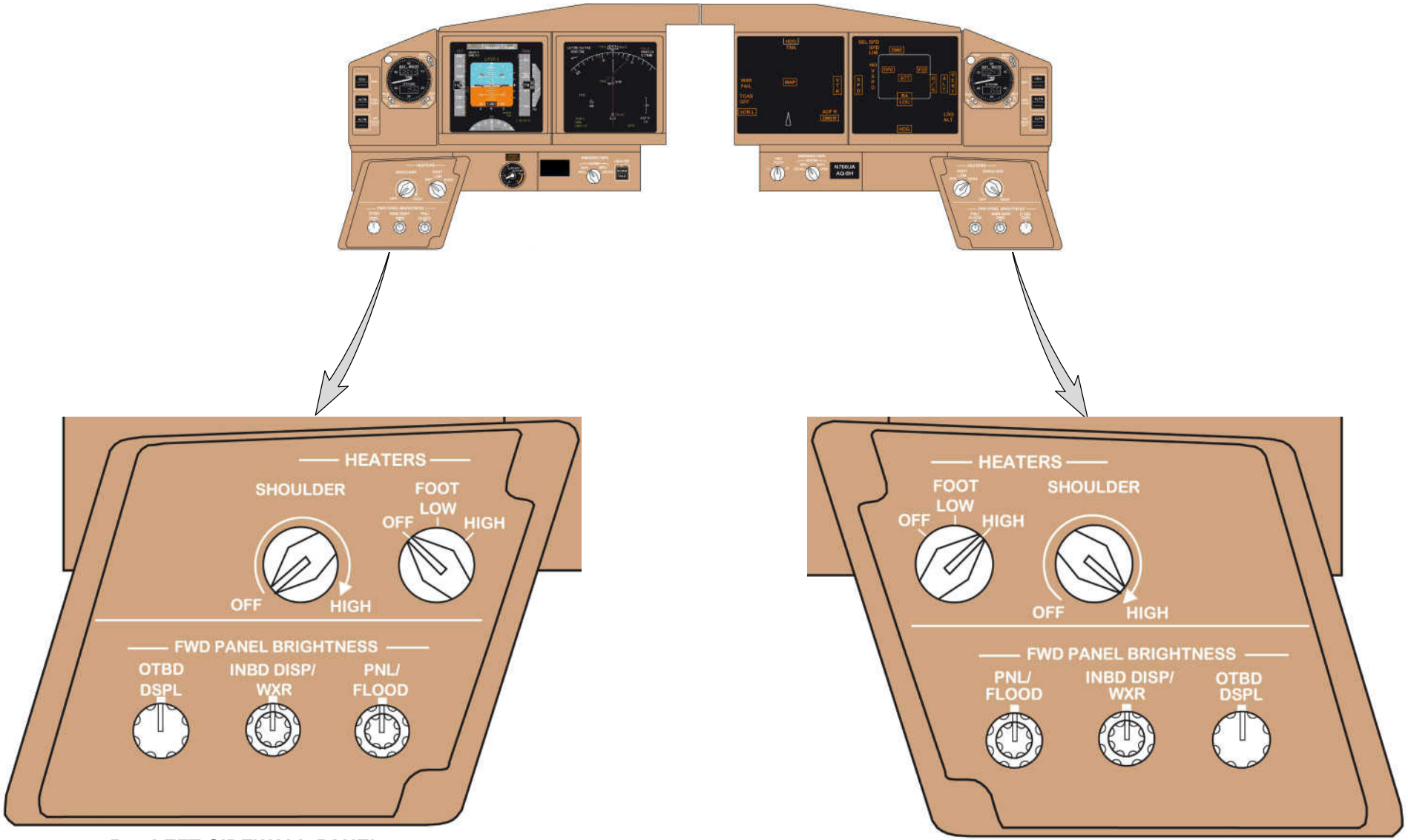


Figure 9 P61 Overhead Maintenance Panel



P13 LEFT SIDEWALL PANEL

P14 RIGHT SIDEWALL PANEL

Figure 10 P13 and P14 Sidewall Panels

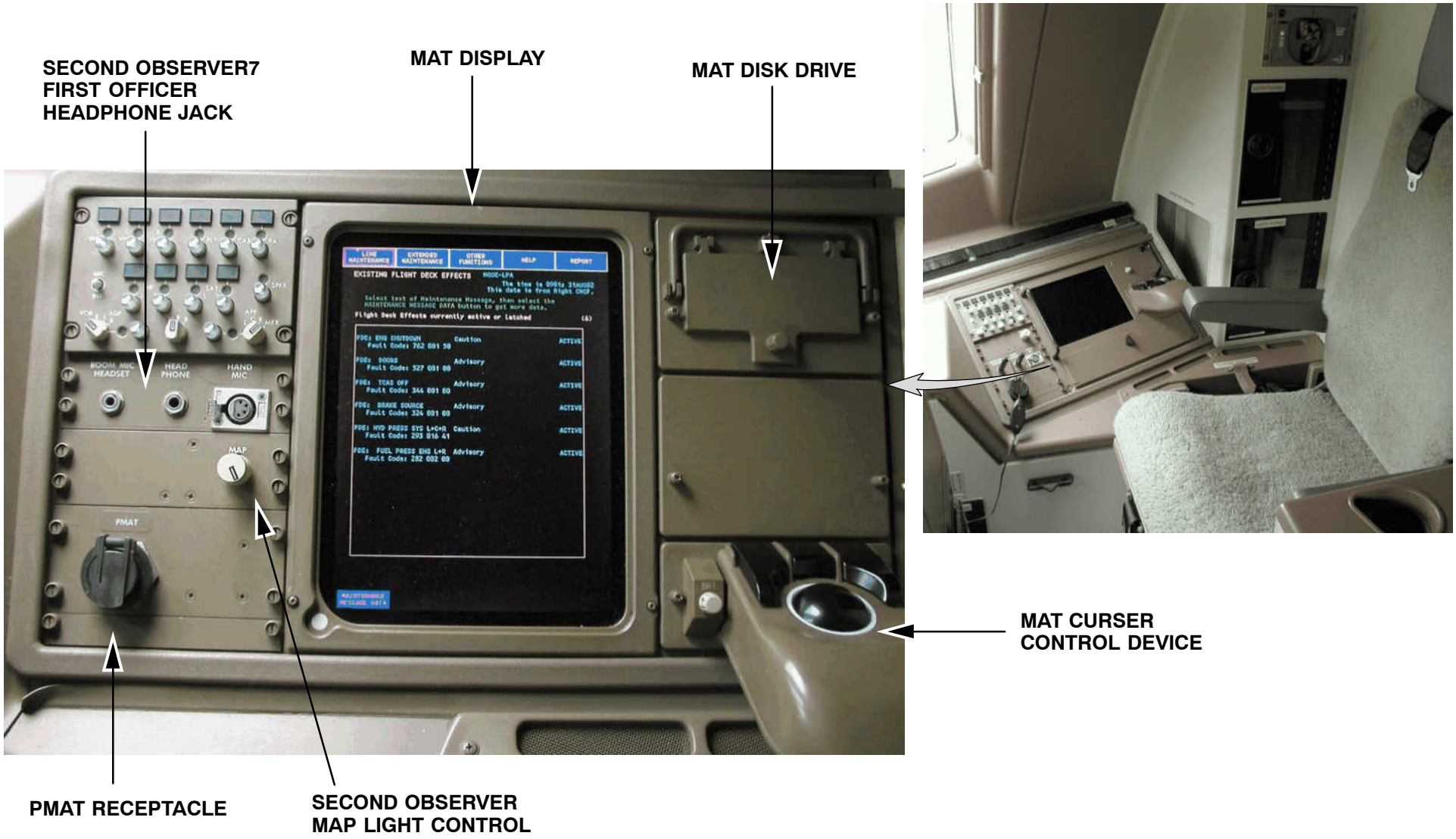


Figure 11 P18 MAT / Second Observer Panel

ATA 05 TIME LIMITS/MAINTENANCE CHECKS

05–00 TIME LIMITS/MAINTENANCE CHECKS GENERAL

INTRODUCTION

General

This Chapter comprises two main parts:

- Section 5–00–00, Time Limits, and Section 5–40–00, Scheduled Maintenance Checks, which are found in the Maintenance Requirements Manual (MRM).
- Section 5–50–00 includes data of the unscheduled maintenance inspection/checks which are done when an aircraft was operated in unusual conditions.

Unscheduled Maintenance Checks

This section includes the data on the unscheduled maintenance checks that must be done when an aircraft is operated, or when servicing is done, in unusual conditions. For some conditions there is more than one task.

The data is given in the sections that follow:

- HARD OR HIGH DRAG/SIDE LOAD LANDING
- SEVERE OR UNUSUAL TURBULENCE, STALL, BUFFET, OR SPEEDS MORE THAN DESIGN LIMITS
- LANDING GEAR OPERATION ABOVE DESIGN SPEED CONDITION
- FLAP/SLAT DOWN OVERSPEED OR ABOVE 20,000 FEET CONDITION
- OVERWEIGHT TAXI CONDITION (CONDITIONAL INSPECTION)
- DRAGGED ENGINE NACELLE/FAN BLADE OUT/ENGINE SEIZURE/ENGINE AND STRUT DAMAGE
- CABIN DEPRESSURIZATION CONDITION
- CONDITIONED AIR PACK OUTLET DUCT SYSTEM FAILURE
- HIGH ENERGY STOP/HEAT DAMAGE/BRAKE FIRE
- BRAKE SEIZURE
- TIRE TREAD LOSS OR TIRE BURST
- WHEEL BEARING FAILURE/DAMAGE
- BIRD/HAIL STRIKE
- LIGHTNING STRIKE
- MERCURY SPILLAGE
- FIRE–RESISTANT HYDRAULIC FLUID REACTION WITH TITANIUM
- EXCESSIVE CABIN PRESSURE LEAKAGE
- NUMBER 3 AND 6 FLAP SUPPORT FUSE PIN FAILURE
- EXTREME DUST
- ICE OR SNOW CONDITION
- EXCEEDING MAXIMUM NOSE LANDING GEAR TOWING ANGLE OR MAXIMUM TOWING LOAD
- VOLCANIC ASH
- TAIL STRIKE CONDITION
- OVERWEIGHT LANDING
- AIRFRAME VIBRATION CONDITION
- DAMAGE DUE TO ENGINE FAN BLADE OUT
- SMOKE OR FUMES IN CABIN
- INTERIOR ICE CONDITION
- FLAT SPOTTED TIRES
- LANDING WITH DEFLATED NOSE GEAR SHOCK STRUT CONDITION (CONDITIONAL INSPECTION)
- ACID SPILLAGE CONDITION

SEVERE OR UNUSUAL TURBULENCE, STALL, BUFFET, OR SPEEDS

LANDING GEAR OPERATION ABOVE DESIGN SPEED CONDITION

DRAGGED ENGINE NACELLE/FAN BLADE OUT/ENGINE SEIZURE/ENGINE AND STRUT DAMAGE

CONDITIONED AIR PACK OUTLET DUCT SYSTEM FAILURE

HIGH ENERGY STOP/HEAT DAMAGE/BRAKE FIRE

CABIN DEPRESSURIZATION CONDITION

FLAP/SLAT DOWN OVERSPEED OR ABOVE 20,000 FEET CONDITION

TIRE TREAD LOSS OR TIRE BURST

WHEEL BEARING FAILURE/DAMAGE

BRAKE SEIZURE

BIRD/HAIL STRIKE

LIGHTNING STRIKE

MERCURY SPILLAGE

FIRE–RESISTANT HYDRAULIC FLUID REACTION WITH TITANIUM

HARD OR HIGH DRAG/SIDE LOAD LANDING

VOLCANIC ASH

AIRFRAME VIBRATION CONDITION

OVERWEIGHT LANDING

INTERIOR ICE CONDITION

FLAT SPOTTED TIRES

LANDING WITH DEFLATED NOSE GEAR SHOCK STRUT CONDITION

ACID SPILLAGE CONDITION

SMOKE OR FUMES IN CABIN

EXTREME DUST

ICE OR SNOW CONDITION

TAIL STRIKE CONDITION

EXCEEDING MAXIMUM NOSE LANDING GEAR TOWING ANGLE OR MAXIMUM TOWING LOAD

EXCESSIVE CABIN PRESSURE LEAKAGE

DAMAGE DUE TO ENGINE FAN BLADE OUT

NUMBER 3 AND 6 FLAP SUPPORT FUSE PIN FAILURE

Figure 12 Time Limits/Maint. Checks Introduction

ATA 06 DIMENSIONS AND AREAS

06−10 DIMENSIONS AND AREAS GENERAL

General

This section gives dimension and area information for this aircraft. Dimensions are measured in planes parallel or perpendicular to the fuselage reference plane. Chord lines are measured as projections on the wing reference plane.

777 Principal Dimensions

These are the principal dimensions of the 777-200 increased gross weight (IGW) airplane on a front and side view.

NOTE: The B777−200LR and B777F have the same wingspan as the B777−300ER, but the same length as the B777−200.

NOTE: The B777−300 has the same wingspan as the B777−200, but the same length as the B777−300ER.

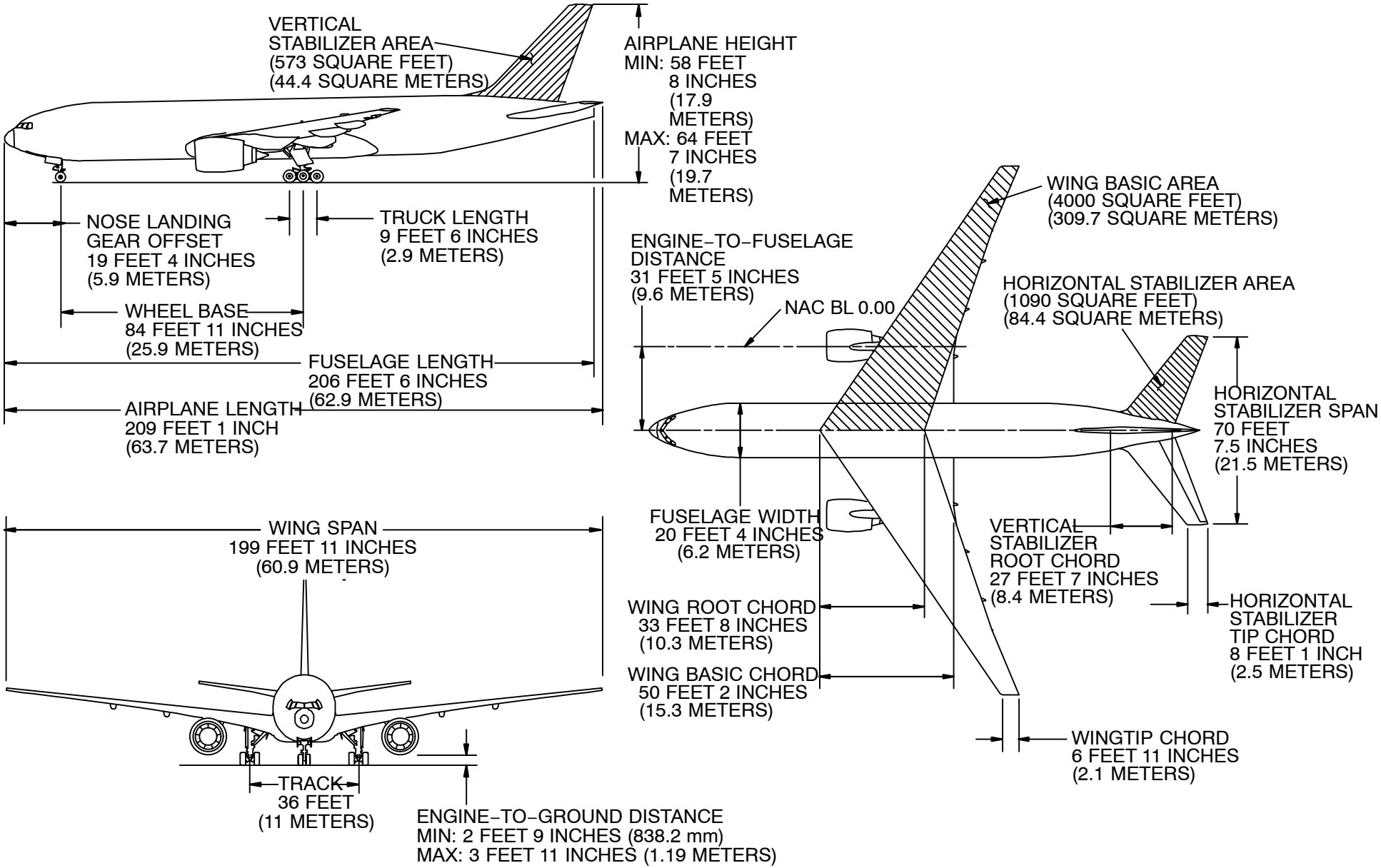


Figure 13 Principal Dimensions (B777-200, 200ER)

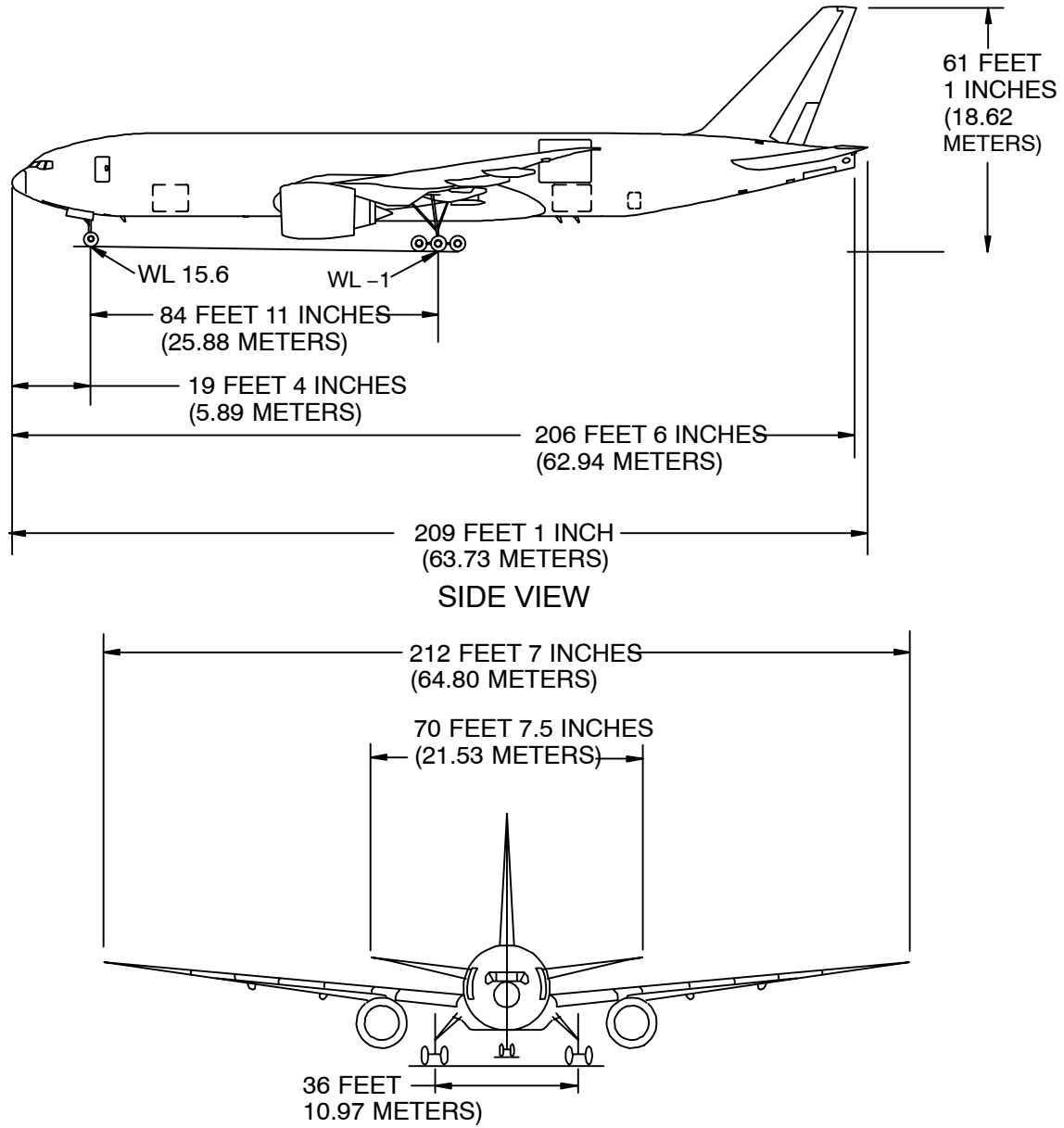


Figure 14 Principal Dimensions (B777F, B777–200LR)

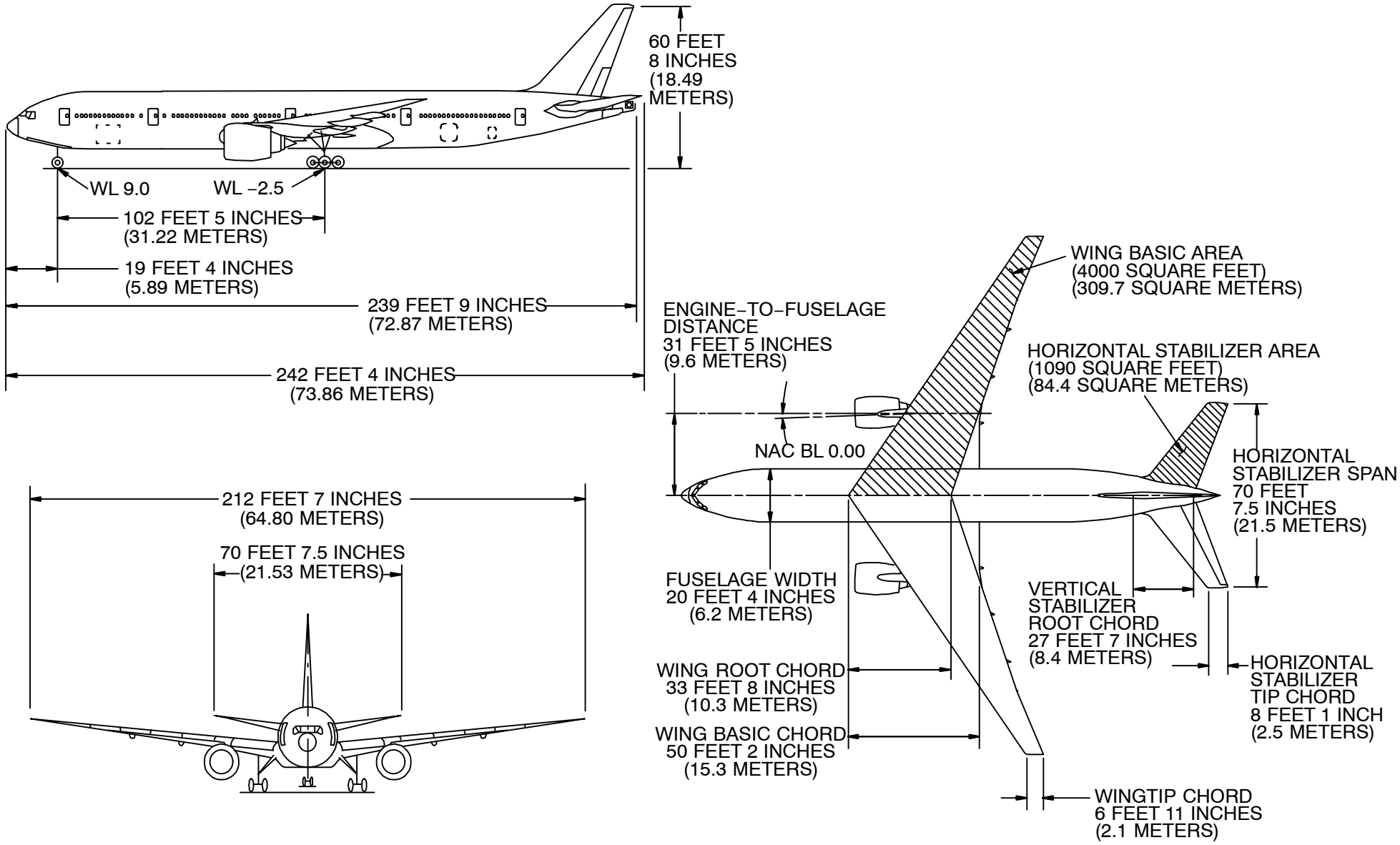


Figure 15 Principal Dimensions (B777–300ER)

06–20 STATIONS

GENERAL DESCRIPTION

General Arrangement

The fuselage has these six manufacturing sections:

- Section 41
- Section 43
- Section 44
- Section 45
- Section 46
- Section 47
- Section 48

Section 41 (STA 92.5 – 655)

Section 41 contains these:

- Flight deck
- Radome
- Forward pressure bulkhead
- Forward equipment center
- Nose gear wheel well
- Main equipment center
- Forward entry doors (2)
- Forward cargo compartment.

Section 43 (STA 655 – 1035)

Section 43 contains these:

- Aft part of the forward cargo compartment
- Main entry doors (2).

Section 44 (STA1035 – 1434)

Section 44 is the center portion of the fuselage. It contains these:

- Keel beam
- Main gear wheel wells (2).

Section 46 (STA 1434 – 1832)

Section 46 contains these:

- Main entry doors (2)
- Aft cargo compartment
- Main Deck Cargo Door (Freighter only)

Section 47 (STA 1832 – 2150)

Section 47 contains these:

- Aft entry doors (2)
- Bulk cargo compartment.

Section 48 (STA 2150 – 2564)

Section 48 contains these:

- Aft pressure bulkhead
- Stabilizer compartment access door
- Auxiliary power unit (APU) firewaLL
- APU inlet and exhaust
- APU access doors
- Aft access door.

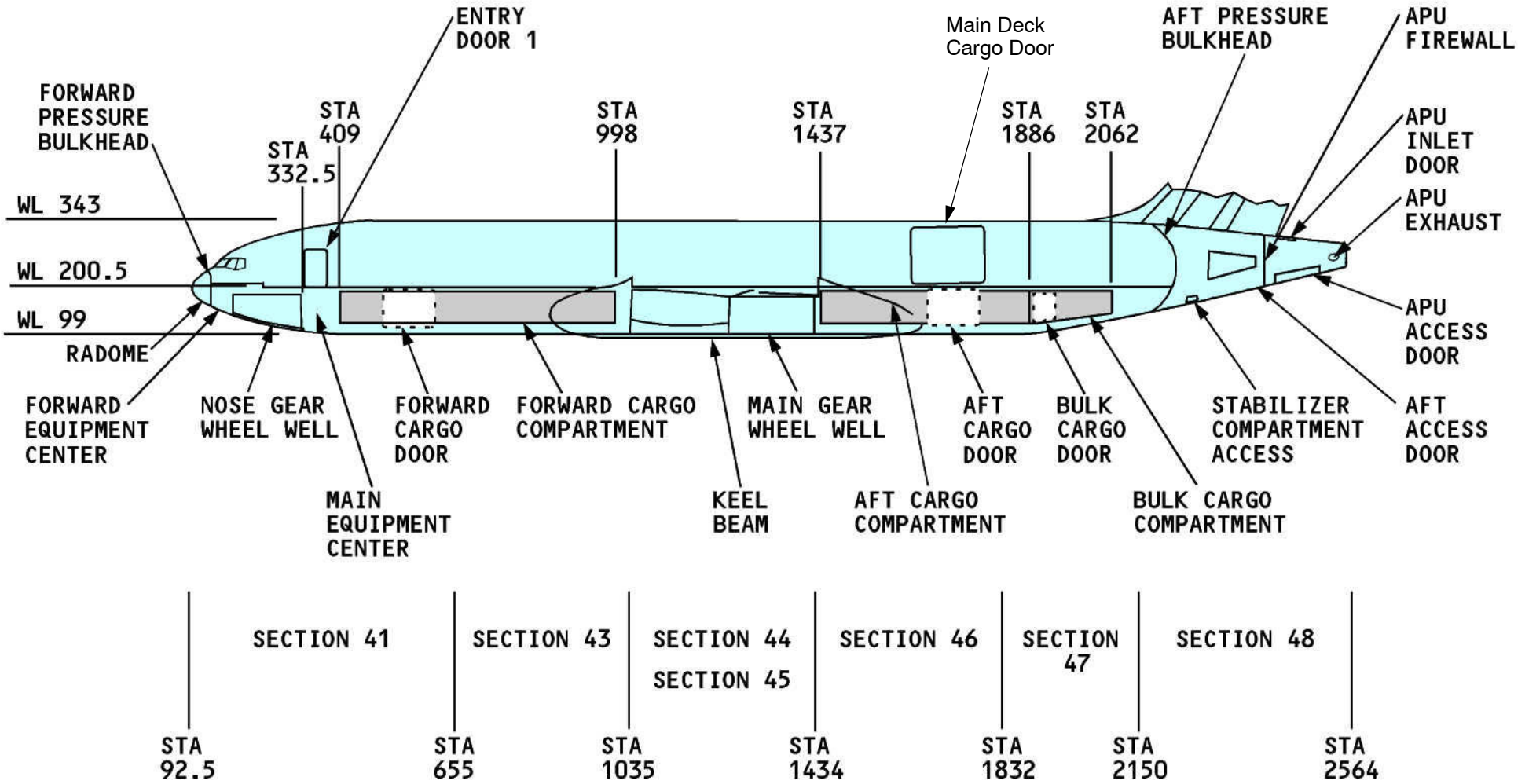


Figure 16 Stations - General Arrangement

06–30 ZONING

GENERAL DESCRIPTION

General

The 777 airplane is divided into 8 major zones to help you find and identify the airplane components and parts. The major zones are divided into subzones and the subzones into zones.

A three–digit number identifies the major zones, subzones, and zones as follows:

- Major Zone:

  The first digit is a number from 1 to 8 followed by two zeroes.
- Subzone:

  The first digit represents the major zone, the second digit is a number from 1 to 6 or 9, and the third digit is a zero.
- Zone:

  The first two digits represent the subzone number and the third digit shows a component or group of components that are in the subzone.

DESCRIPTION

Major Zones

The major zones are:

- 100 – lower half of the fuselage
- 200 – upper half of the fuselage
- 300 – empennage and body section 48
- 400 – power plants and nacelle struts
- 500 – left wing
- 600 – right wing
- 700 – landing gear and landing gear doors
- 800 – passenger and cargo compartment doors.

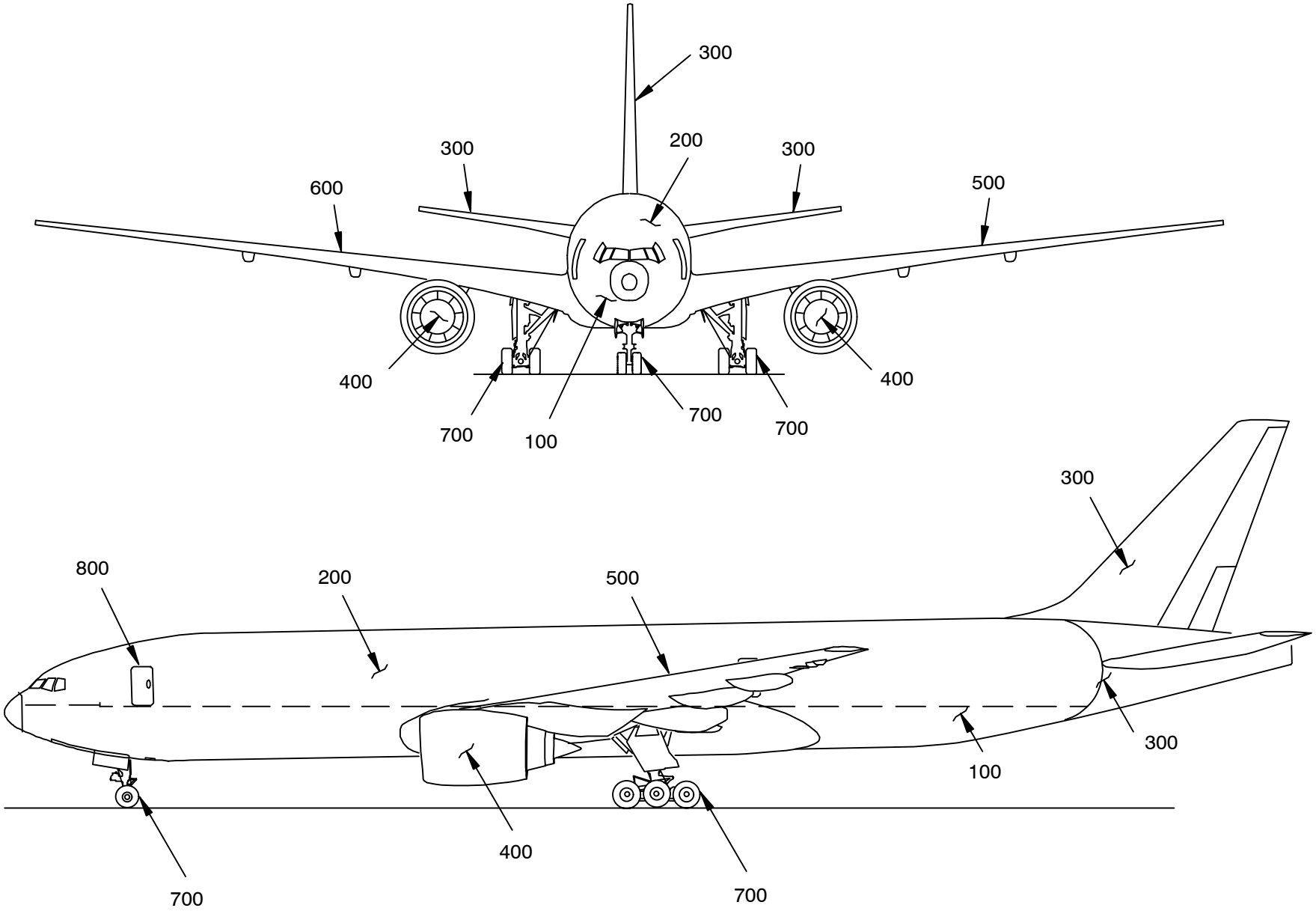


Figure 17 General – Zone Diagrams – Airplane Major Zones

Subzones and Zones

Each of the structural components, passenger compartment doors, cargo compartment doors, landing gear doors, rudders, elevators, flaps, ailerons, spoilers, leading edge devices, and equivalent components has a different zone number.

The zones are numbered in the sequence that follows:

- Wings – inboard to outboard and front to back.
- Horizontal Stabilizer and Elevator – inboard to outboard and front to back.
- Vertical Stabilizer and Rudder – leading edge to the trailing edge the of vertical stabilizer.
- Fuselage – front to back and away from the floorline.

Access Panel Identification

Access doors or panel have five digit alpha-numeric codes. The codes have these parts:

- First three digits:

  Airplane zone
- Fourth digit:

  A letter that identifies each access door or panel in a zone. If there are more than one access panels in a zone, they have letters (A, B, C, etc.). The letters increase inboard to outboard, bottom to top, and forward to aft.
- Fifth digit:

  A letter that gives additional location information if the access door or panel is on the top (T), bottom (B), left (L), right (R), internal (Z), ceiling (C), floor panels (F), floor panels (use G when F sequence designation is used), sloping sidewall (S), sidewall (W).

NOTE: A small number of access doors or panels have six digit codes. This occurs when a panel is added later in production. In this condition, the first three digits are the zone number. The fourth and fifth digits (letters) designate the panel. The sixth digit gives the additional location information.

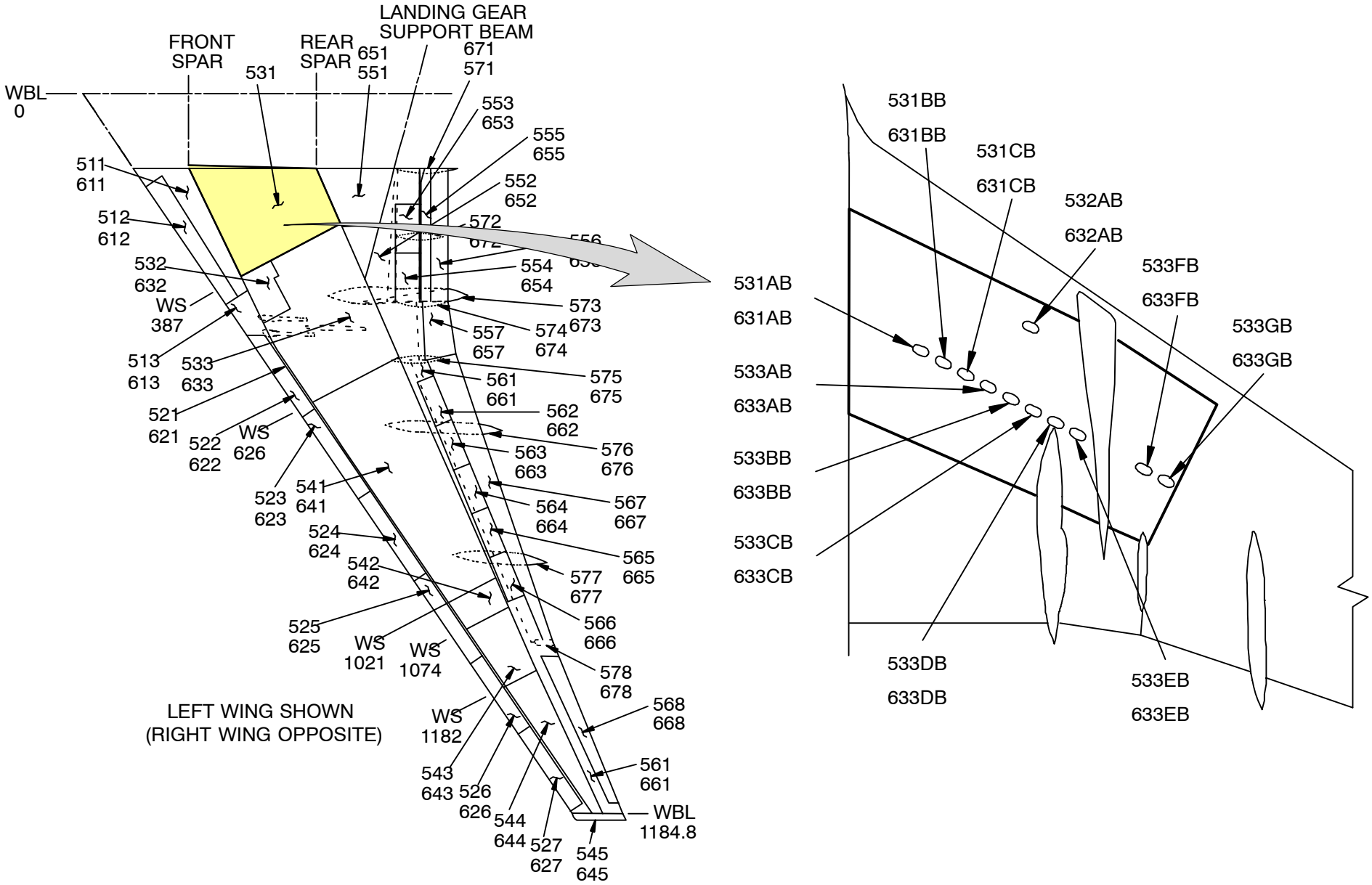


Figure 18 General – Zone Diagrams – Subzones and Zones

EQUIPMENT CENTER AND RACKS

Equipment Centers

The main equipment center is aft of the nose wheel well. The forward equipment center is forward of the nose wheel well.

The E16 rack is forward and the E5 rack is aft of the forward cargo door. The E17 rack is forward and the E6 rack is aft of the aft cargo door.

The E11 and E7 racks are overhead in the passenger compartment.

The E10 rack is in the bulk cargo compartment aft of the bulk cargo door.

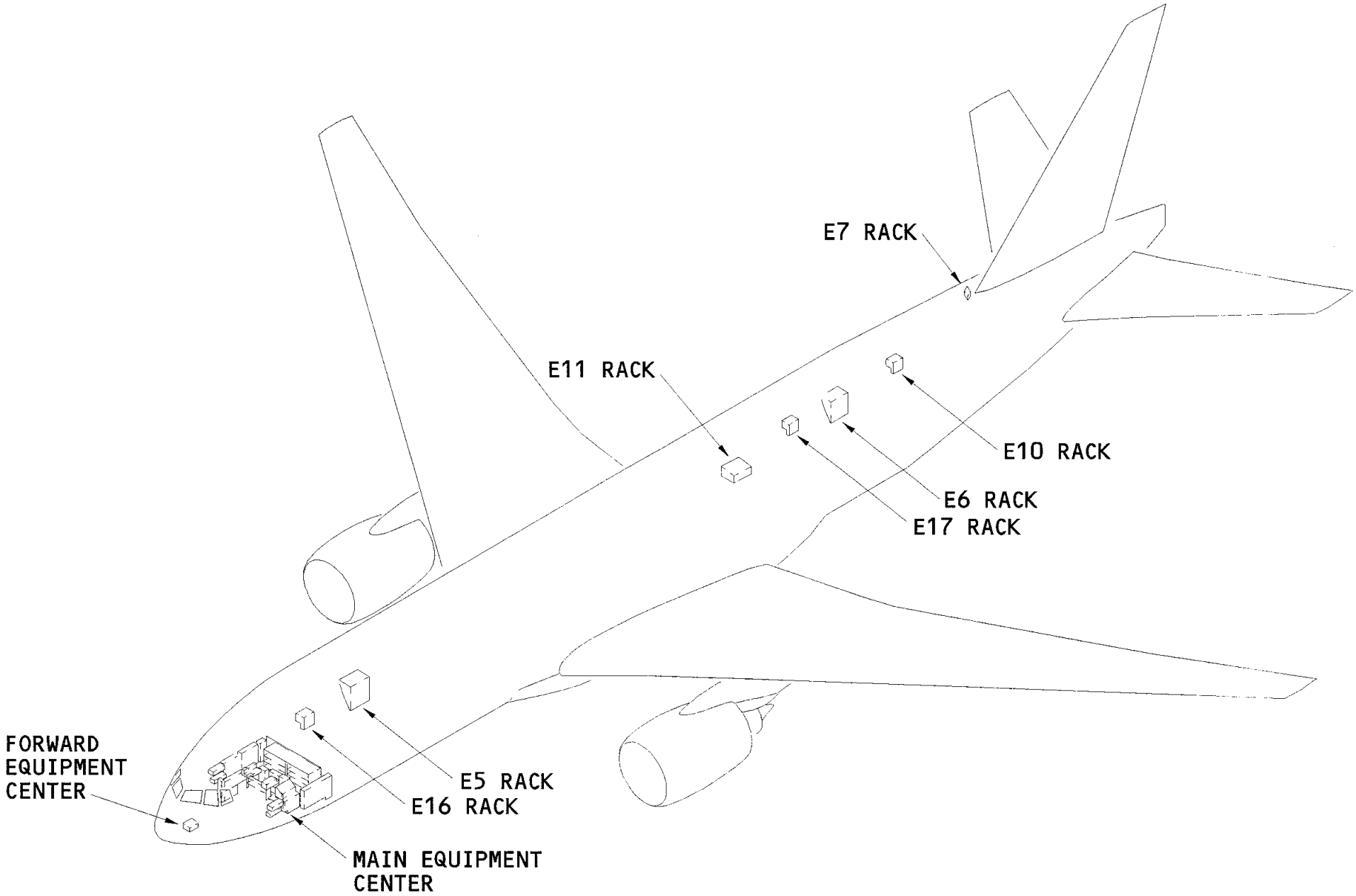


Figure 19 Equipment Center and Racks

MAIN EQUIPMENT CENTER – 1

Main Equipment Center Electronics

The main equipment center (MEC) contains most of the electronics equipment on the airplane. The electronics equipment in the MEC is on the E1, E2, E3, and E4 racks. The equipment in the MEC includes electronics for these functions:

- Information management
- Generator control
- Transformer rectifier
- Flight control and autopilot
- Environmental control
- Recording
- Navigation
- Communication
- Cabin management
- Weight and balance
- Air data
- Inertial data
- Warning
- Proximity sensing
- Engine control.

Power Management

The MEC also contains these components for the electrical loads management system (ELMS):

- Power panels
- Power management panels.

Access to the Main Equipment Center

Access to the MEC is through these:

- Access hatch in the bottom of the airplane
- Access hatch in the passenger compartment
- Door from the forward cargo compartment.

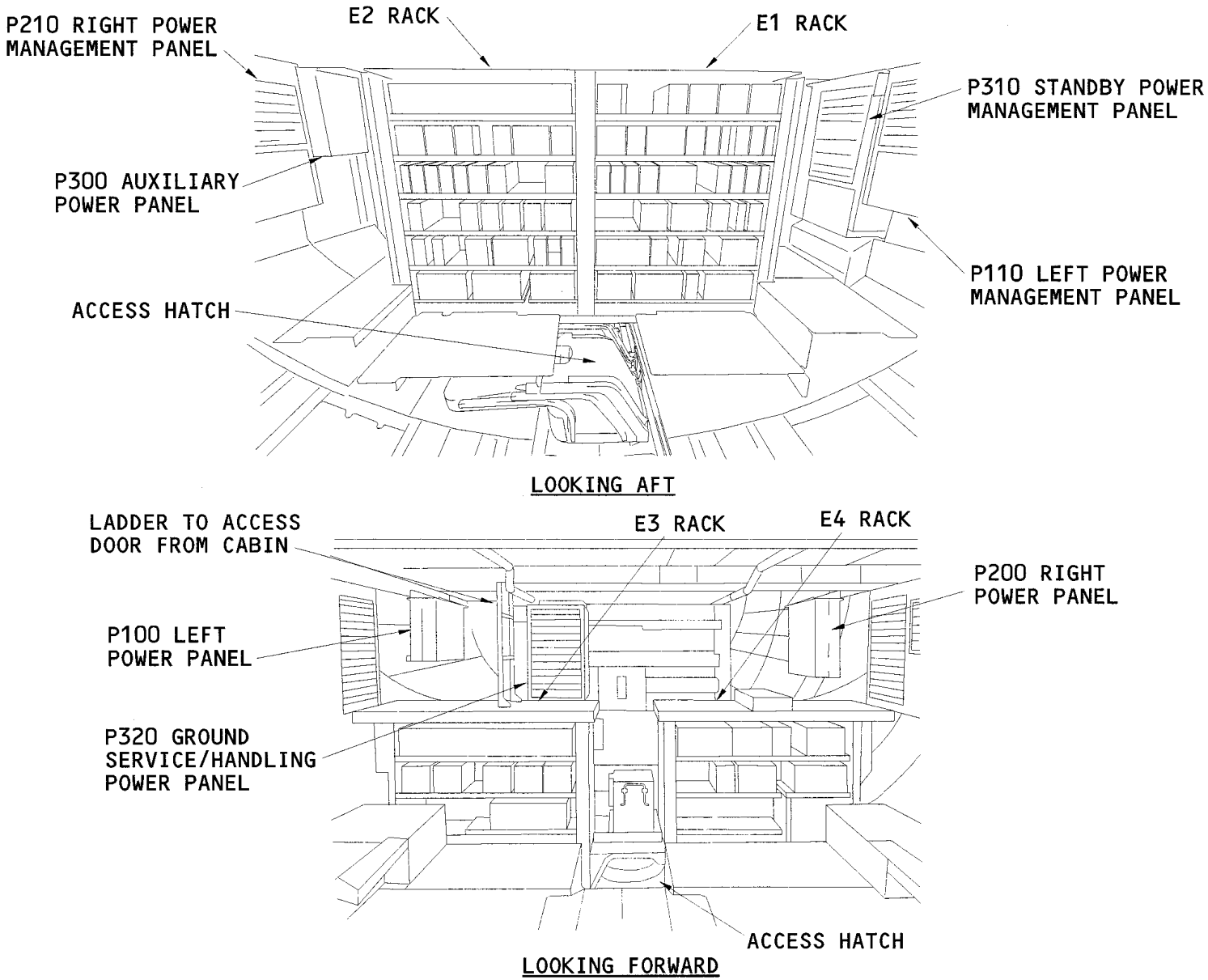


Figure 20 Main Equipment Center – 1

MAIN EQUIPMENT CENTER – 2

General

The systems card files hold interface cards for systems that use ARINC 429 buses.

These are the two systems card files in the main equipment center:

- P85 left systems card file (LSCF)
- P84 right systems card file (RSCF).

P85 Left Systems Card File

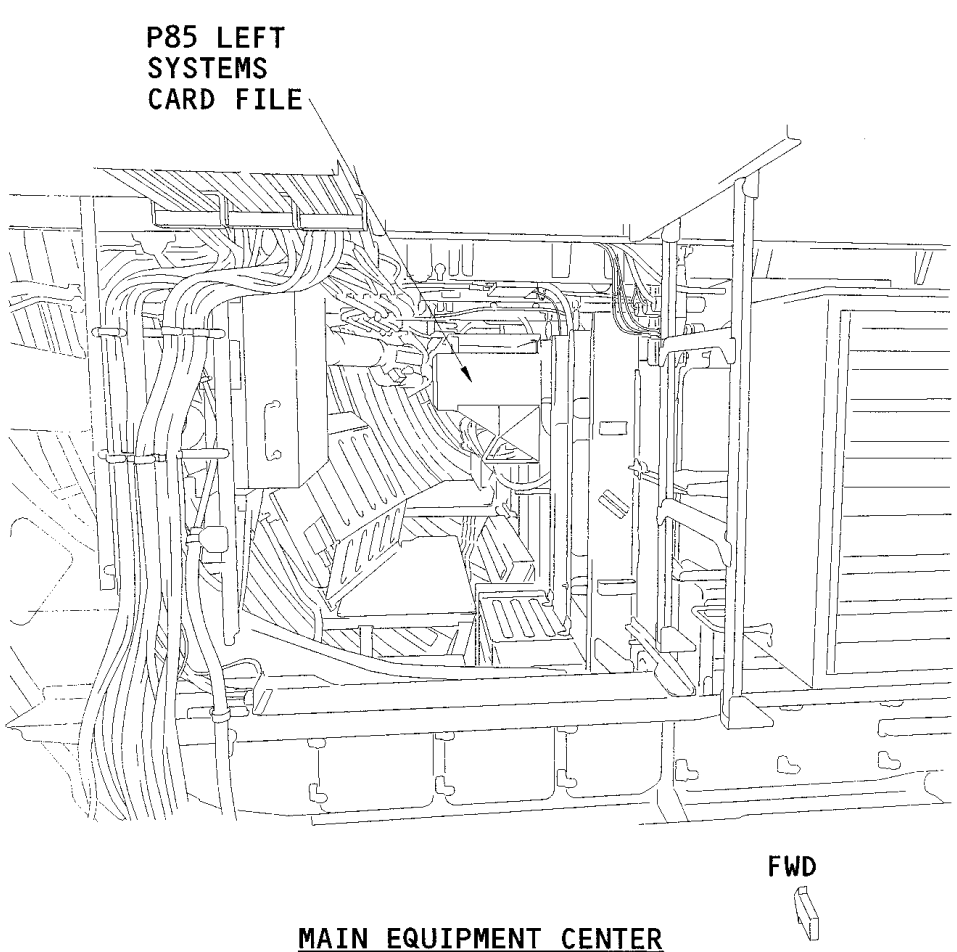
The LSCF has cards for these systems:

- Power supply units (PSUs)
- Hydraulic interface modules (HYDIMs)
- Duct leak and overheat detection system (DLODS)
- Airfoil and cowl ice protection system (ACIPS)
- APU fire/overheat detection
- Left engine fire/overheat detection
- ARINC 629 signal gateway (ASG)
- Environmental control system (ECS)
- Weight on wheels (WOW).

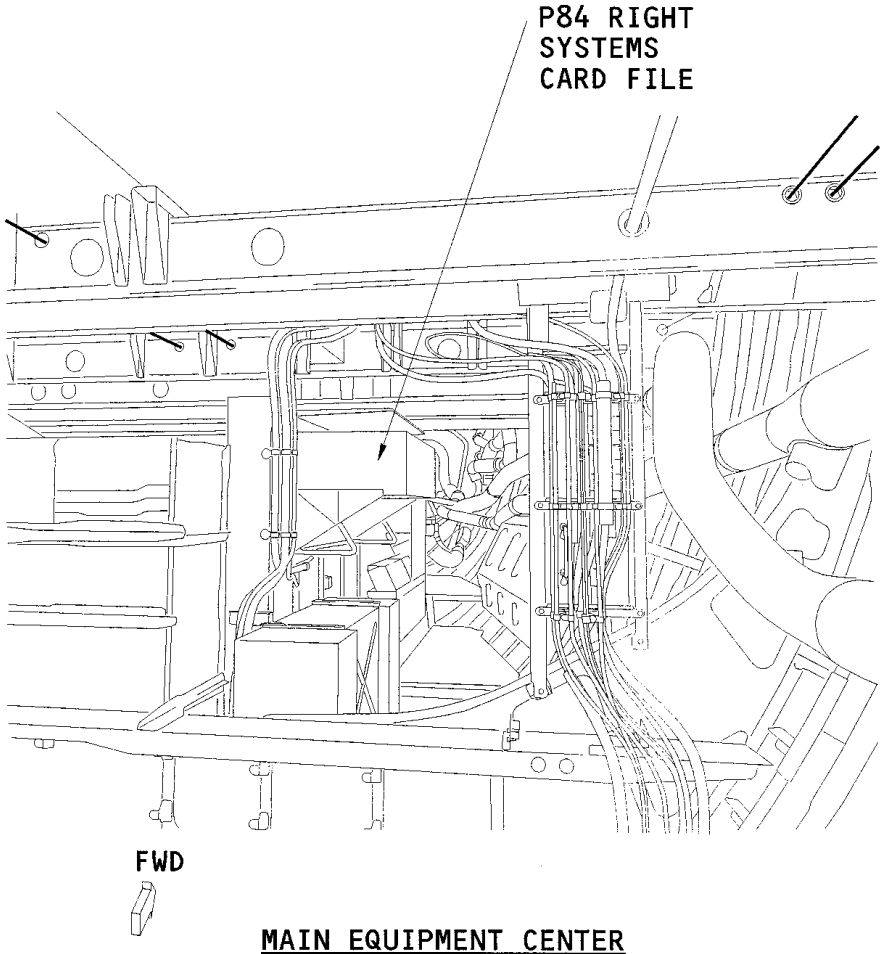
P84 Right Systems Card File

The RSCF has cards for these systems:

- Power supply units (PSUs)
- Hydraulic interface modules (HYDIMs)
- Duct leak and overheat detection system (DLODS)
- Airfoil and cowl ice protection system (ACIPS)
- Right engine fire/overheat detection
- ARINC 629 signal gateway (ASG)
- Environmental control system (ECS)
- Weight on wheels (WOW).



MAIN EQUIPMENT CENTER
(LEFT SIDE, LOOKING FORWARD)



MAIN EQUIPMENT CENTER
(RIGHT SIDE, LOOKING FORWARD)

Figure 21 Main Equipment Center – 2

FORWARD EQUIPMENT CENTER

Forward Equipment Center Electronics

The forward equipment center contains the weather radar receiver/transmitter (WXR/RT).

Access to the Forward Equipment Center

Access to the forward equipment center is through the access door forward of the nose landing gear.

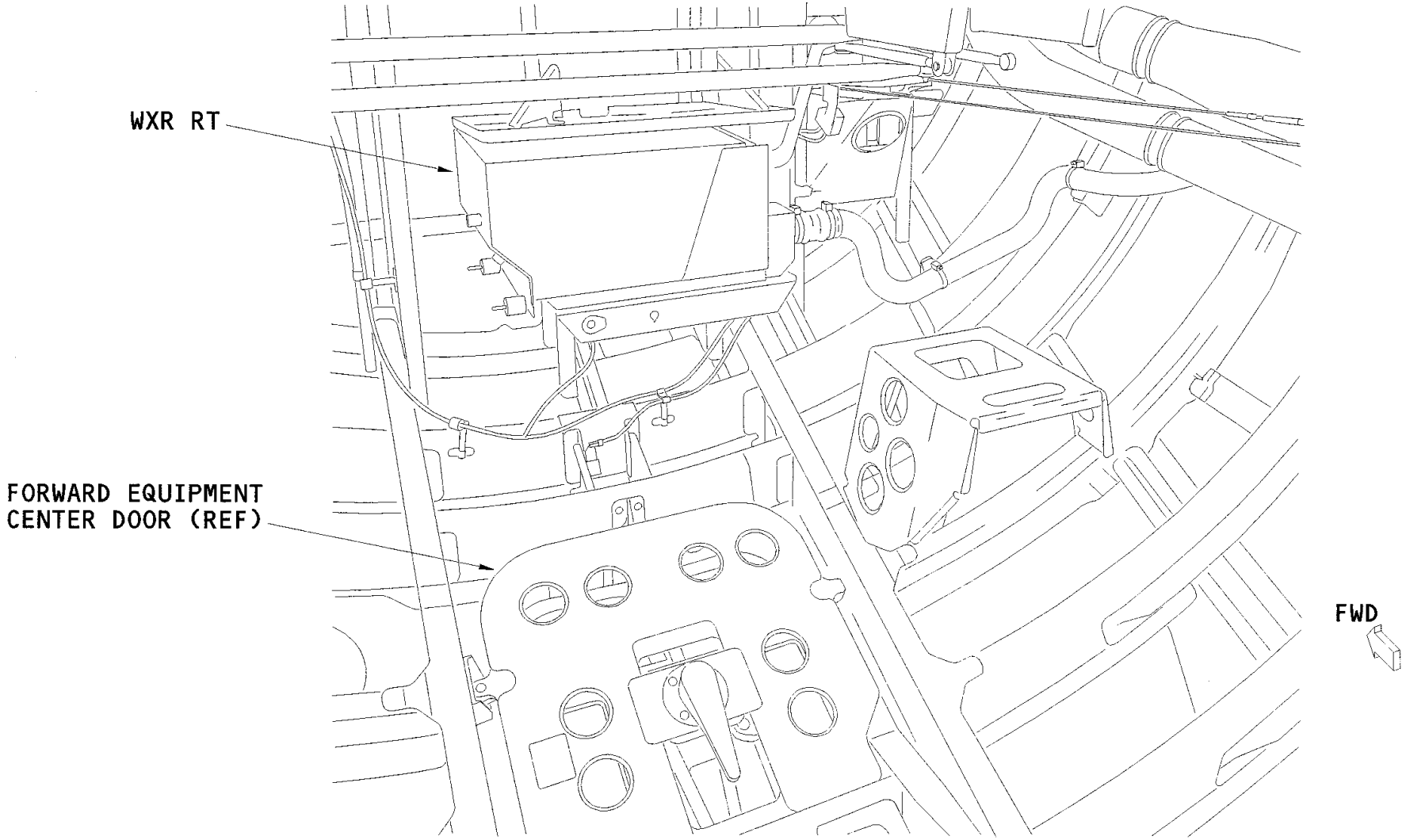


Figure 22 Forward Equipment Center

CARGO DOOR EQUIPMENT RACKS

General

These four equipment racks are adjacent to the cargo doors:

- E16 rack and E5 rack (forward cargo door)
- E17 rack and E6 rack (aft cargo door).

E16 Rack

The E16 rack is at the forward cargo door at station 501. It contains components for these functions:

- Primary flight control
- Cargo handling.

E5 Rack

The E5 rack is at the forward cargo door at station 613. It contains components for these functions:

- Primary flight control power
- Actuator control electronics
- Radio altitude
- Fuel quantity.

E17 Rack

The E17 rack is at the aft cargo door at station 1678. It contains components for cargo handling.

E6 Rack

The E6 rack is at the aft cargo door at station 1754. It contains components for these functions:

- HF communication
- Brake and tire system
- Main gear steering.

Access for Cargo Door Equipment Racks

Access for these equipment racks is at the cargo doors. You must open the cargo door to get access to the equipment rack. You then release and open a protective cover to get to the equipment on the rack.

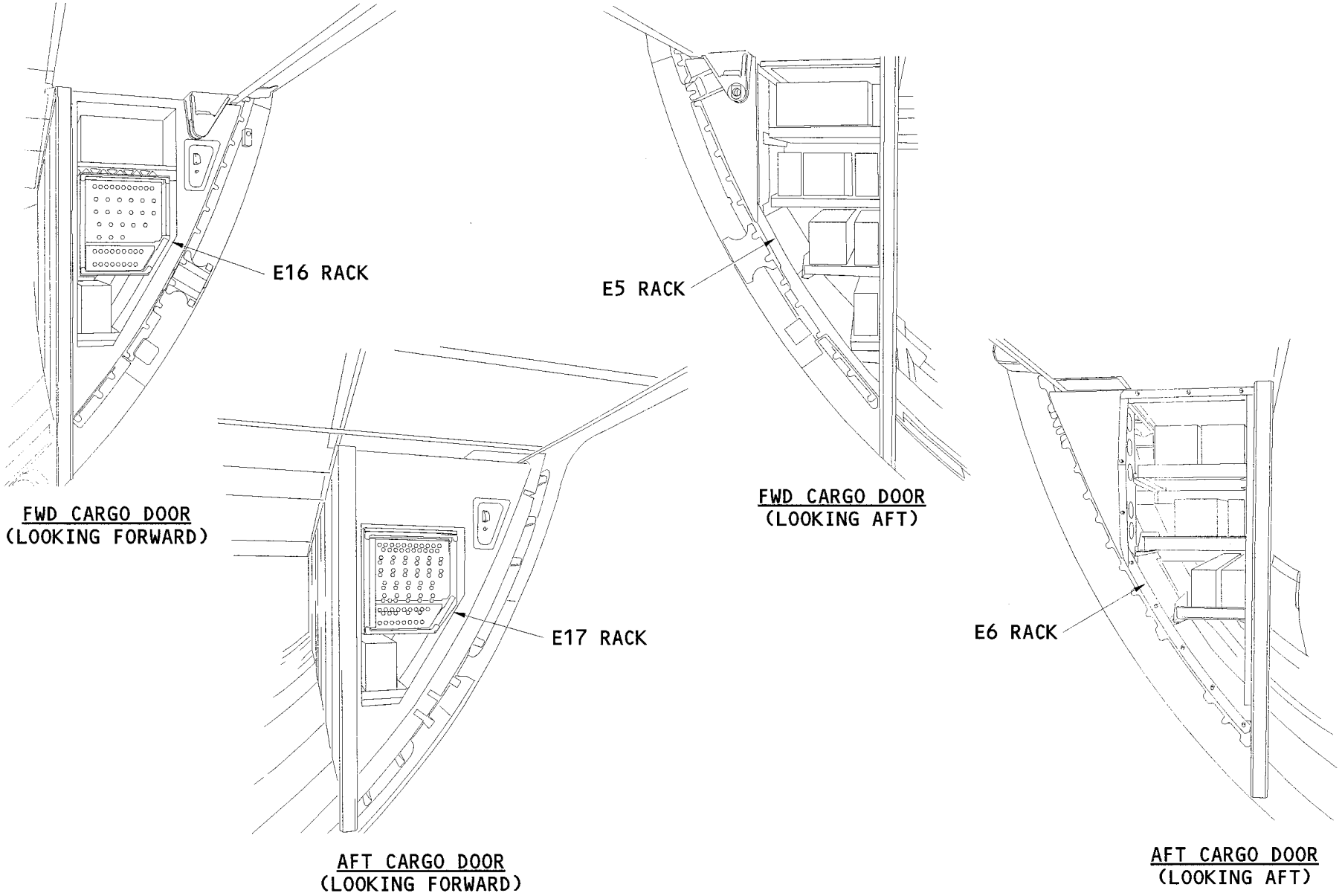


Figure 23 Cargo Door Equipment Racks

OTHER EQUIPMENT RACKS

General

In addition to the equipment racks in the main equipment center and at the forward and aft cargo doors, there are these other equipment racks in the airplane:

- E11 rack
- E7 rack
- E10 rack

Ell Rack

The E11 rack is in the passenger compartment above the door 3 cross-aisle at station 1530. It is on the left of airplane center. Access is through a ceiling panel.

The E11 rack contains satellite communication (SATCOM) equipment.

E7 Rack

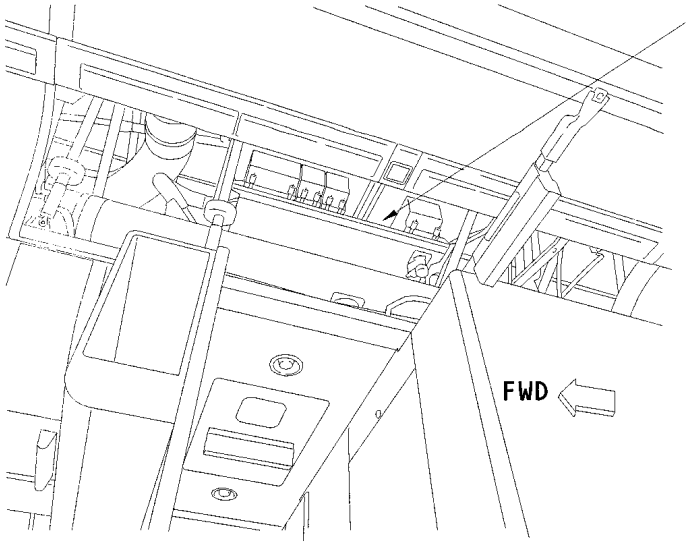
The E7 rack is in the passenger compartment above the aft galley at station 2100. It is on the right side of the airplane. Access is through a ceiling panel.

The E7 rack contains recorder equipment and the AN controller.

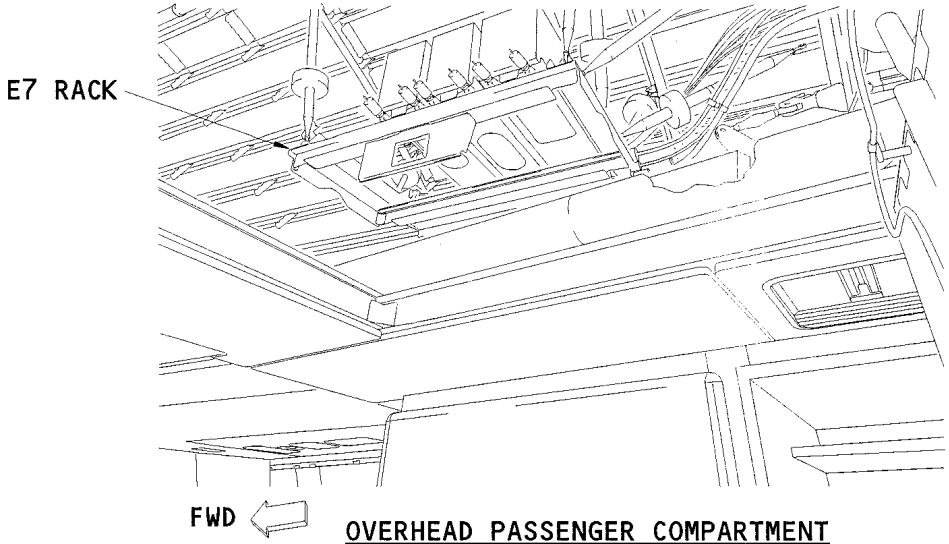
E10 Rack

The E10 rack is aft of the bulk cargo door on the right side of the lower lobe at station 1937. Access is through a door that faces inboard.

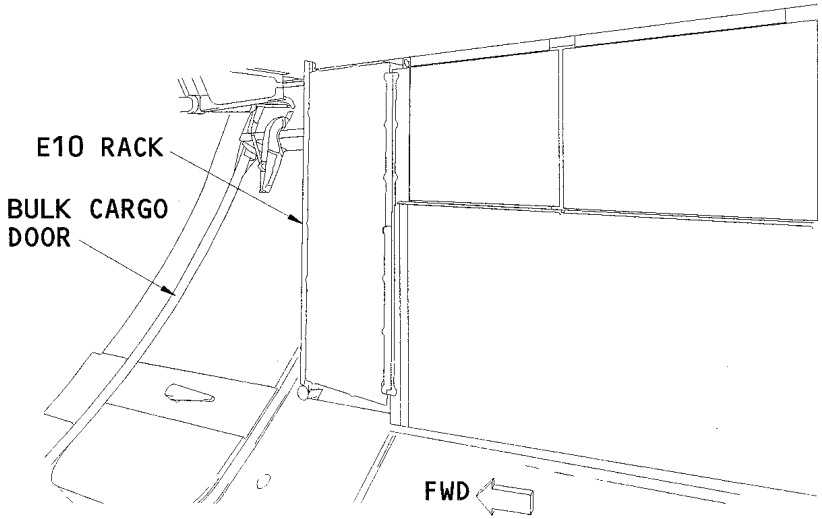
The E10 rack contains the APU battery and charger.



OVERHEAD PASSENGER COMPARTMENT
(LEFT SIDE LOOKING INBOARD)



OVERHEAD PASSENGER COMPARTMENT
(RIGHT SIDE LOOKING OUTBOARD)



BULK CARGO COMPARTMENT
(RIGHT SIDE LOOKING OUTBOARD)

Figure 24 Other Equipment Racks

ANTENNA LOCATIONS

Antenna Locations

These are the communication and navigation system antennas:

- Weather Radar
- TCAS (traffic alert and collision avoidance system)
- ATC (air traffic control)
- GPS (global positioning system)
- VHF (very high frequency) communication
- SATCOM (satellite communication)
- ADF (automatic direction finder)
- HF (high frequency) communication
- VOR (VHF omni range)
- Marker beacon
- RA (radar altimeter)
- DME (distance measuring equipment)
- ILS (instrument landing system).

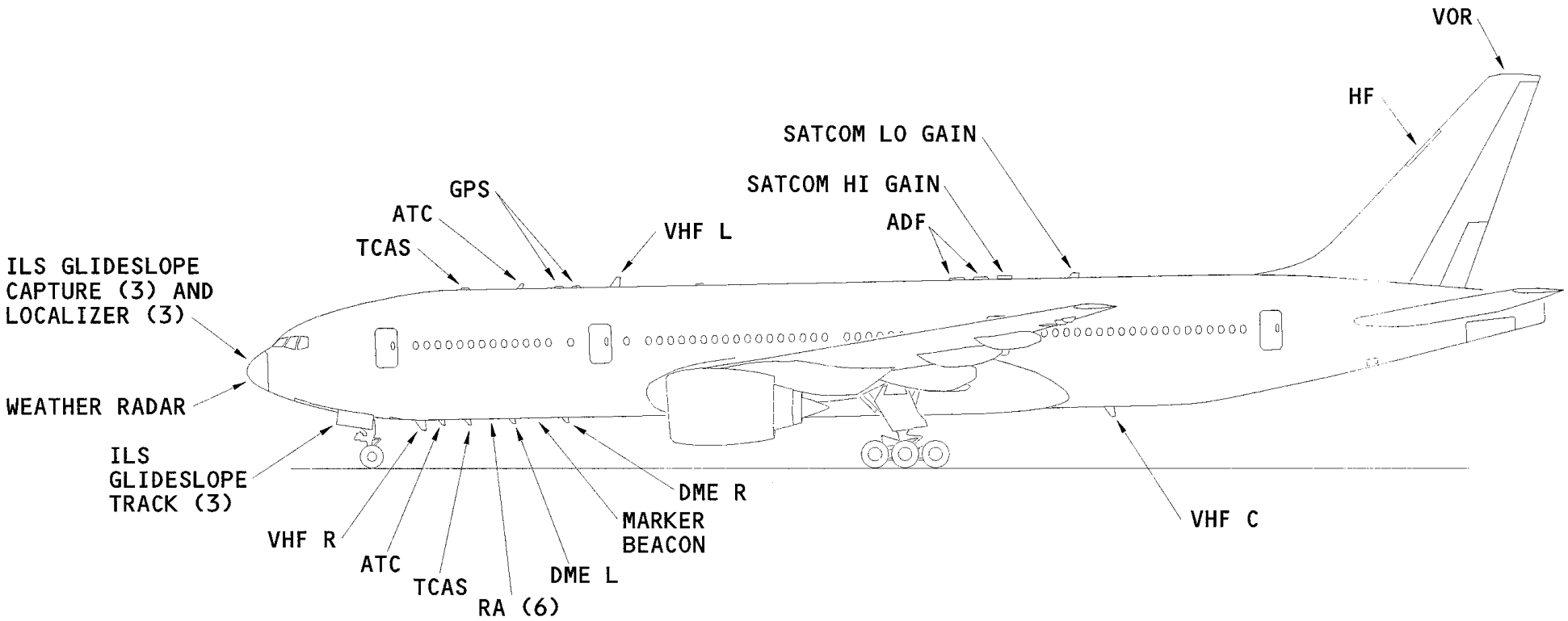


Figure 25 Antenna Locations

ATA 07 LIFTING AND SHORING

07–00 LIFTING AND SHORING GENERAL

GENERAL

You can lift all of the airplane on jacks, or lift only the airplane nose. You can also jack the airplane axles.

To lift the airplane, there are three primary jack points. There are five auxiliary jack points to make the airplane stable after the airplane is at the necessary height.

The airplane has seven axle jack points.

AIRPLANE JACKING

Before you jack the airplane, you must make sure that the airplane gross weight and center of gravity are within specified limits.

Also, the loads on the jacks must be within limits. These loads are a function of airplane gross weight.

When you jack the airplane, the airplane must remain level within specified limits. One person must stay in the nose wheel well to monitor the airplane inclinometers.

Airplane Jack Points, Pads, and Adapters

The three primary jack points are: A, B, and C. These jack points have jack pads which are part of the airplane body.

The auxiliary jack points are: D, E, F, G, and H. You must install adapters at these points before you put a jack there. You must remove bolts from the airplane body before you install the jack adapter at point D.

Nose Jacking

You use jack point D to jack only the airplane nose.

CAUTION: DO NOT LIFT THE NOSE OF THE AIRPLANE TO MORE THAN SIX INCHES OF TIRE CLEARANCE. IF YOU LIFT THE NOSE HIGHER, SIDE LOADS THAT ARE MORE THAN DESIGN LOAD LIMITS CAN OCCUR. THIS CAN CAUSE DAMAGE TO THE JACK RAM AND JACK ADAPTER BECAUSE THEY WILL MOVE IN AN ARC.

Axle Jacking

There are three axle jack points on each main gear (not shown). There is one axle jack point on the nose gear. The pads of the axle jack points are all part of the landing gear.

You can lift the airplane on one axle or a combination of axles. If you use a jack on one axle, you can jack the airplane in winds up to 35 knots. When you use two or more axle jacks, you can jack the airplane in winds up to only 25 knots.

If you have two flat tires on an axle, you can use axle jacking bars to lift the axle enough to install the axle jack.

If you supply electrical power to the airplane while it is on jacks, obey this warning:

WARNING: DO THE DEACTIVATION PROCEDURE FOR THE AIR MODE SIMULATION (AMM 32-09-01) BEFORE YOU LIFT THE AIRPLANE. IF YOU DO NOT OBEY THESE INSTRUCTIONS, INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

CAUTION: DO NOT LIFT THE AIRPLANE ON JACKS IN WINDS MORE THAN 35 KNOTS. IF YOU DO NOT OBEY THESE INSTRUCTIONS, DAMAGE TO THE AIRPLANE CAN OCCUR.

NOTE: IF YOU USE JACKS THAT HAVE GENERAL SPECIFICATIONS BUT ARE NOT DESIGNED FOR THE 777, BE CAREFUL. IT IS POSSIBLE THAT THE MAXIMUM WIND SPEED LIMIT (35 KNOTS) WILL HAVE TO BE DECREASED.

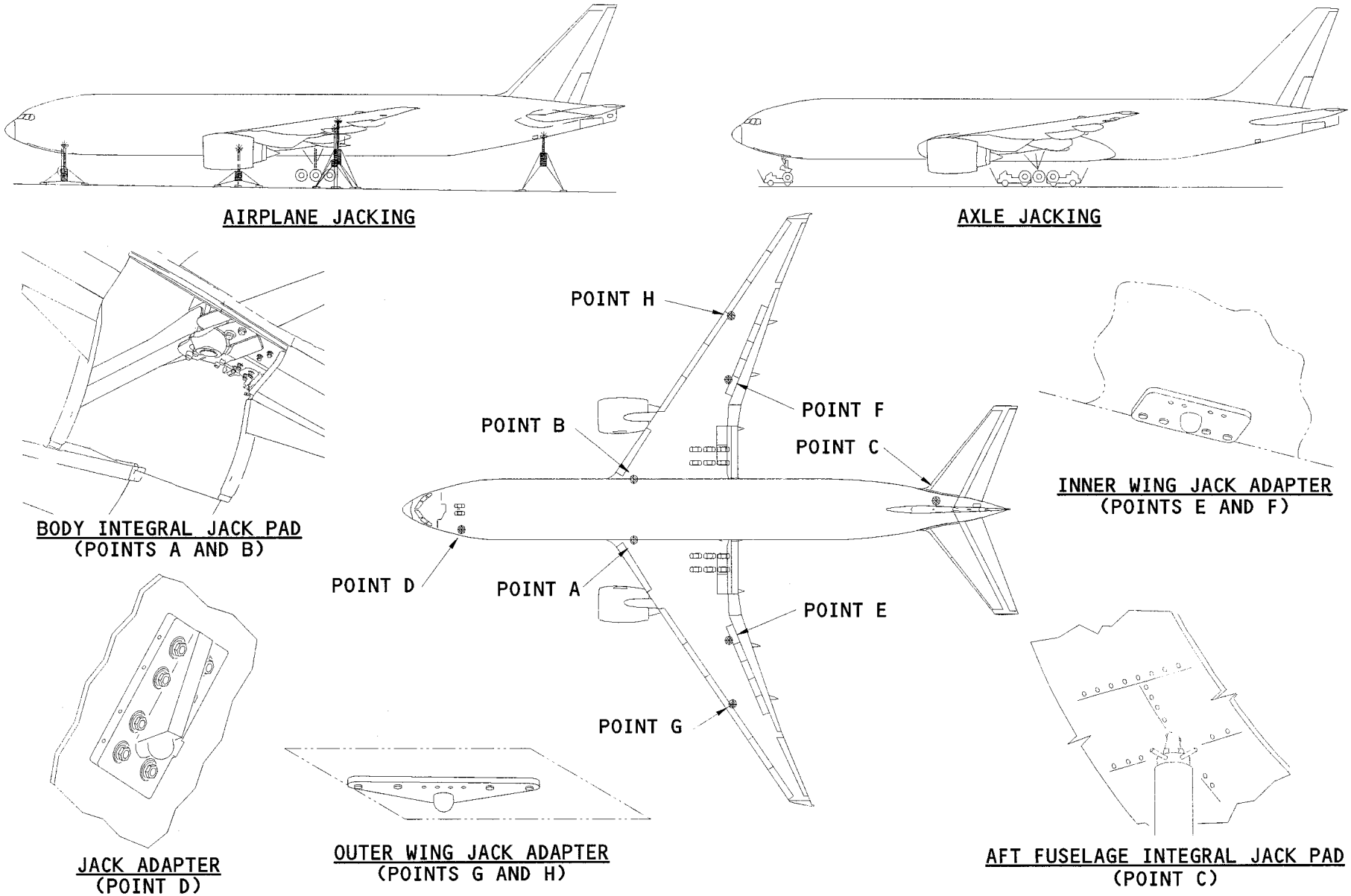


Figure 26 Airplane Jacking

ATA 08 LEVELING AND WEIGHING

08–00 LEVELING AND WEIGHING GENERAL

LEVELING/WEIGHING GENERAL

For some maintenance procedures, the airplane must be level. To do a check of the airplane attitude, the airplane has these components:

- Longitudinal inclinometer
- Lateral inclinometer
- Plumb bob fitting
- Plumb bob scale.

You can use either the inclinometers or the plumb bob scale to find the airplane pitch and roll attitudes.

The longitudinal inclinometer tells you the pitch attitude of the airplane. The lateral inclinometer tells you the roll attitude.

You can hang a plumb bob on the plumb bob fitting. You then can read both the pitch and roll attitudes on the plumb bob scale.

Location

The inclinometers are in the nose wheel well.

The plumb bob fitting and plumb bob scale are in the right main wheel well.

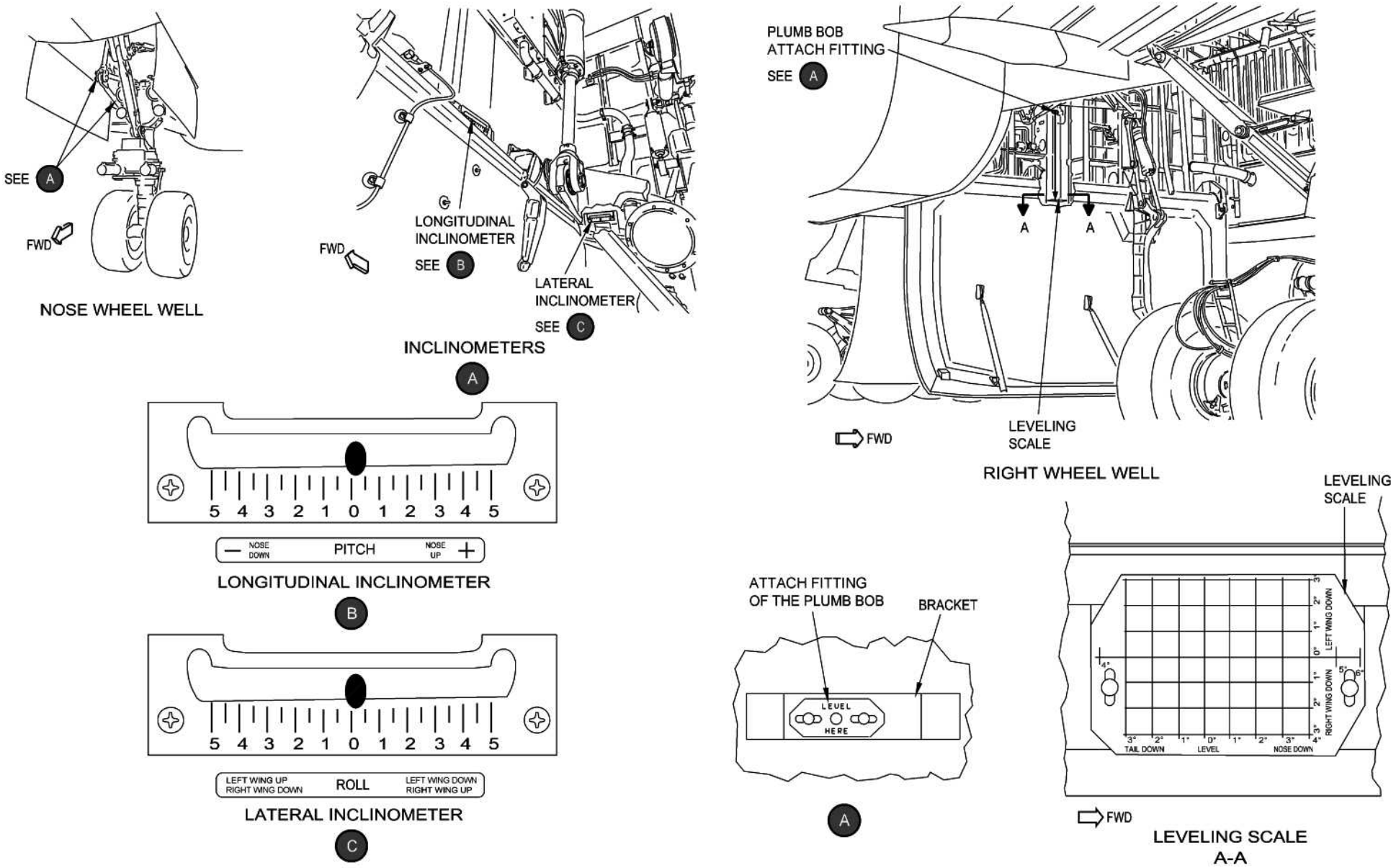


Figure 27 Airplane Leveling

ATA 09 TOWING AND TAXIING

09–00 TOWING AND TAXIING GENERAL

TOWING/TAXIING GENERAL DESCRIPTION

Towing has three tasks:

- Maintenance Towing.
- Pushback/Dispatch Towing.
- Towing the Airplane in High Wind.

DEFINITIONS

Maintenance Towing

The movement of an airplane for maintenance/remote parking purposes (e.g., from the gate to a maintenance hangar). Aircraft is typically unloaded with minimal fuel load.

Pushback Towing

The movement of a fully loaded aircraft (up to Maximum Ramp Weight (MRW)) from the parking position to the taxiway. Movement includes; pushback with turn, a stop, and short tow forward to align aircraft and nose wheels. Engines may or may not be operating. Airplane movement is similar to a conventional pushback operation with a towbar.

Dispatch (Operational) Towing

The movement of a revenue aircraft (loaded with passengers, fuel, and cargo up to Maximum Ramp Weight (MRW)), from the terminal gate/remote parking area, to a location near the active runway. The movement may cover several kilometers with speeds up to 32 km/h (20 mph), with several starts, stops and turns. Replaces typical taxiing operations prior to takeoff.

Towing Description

The design of the airplane will permit you to tow or push the airplane from the nose or main landing gear.

A forward tow fitting on the nose and the main landing gear can be used to tow the airplane with a tow bar.

An aft tow fitting can be installed on the nose landing gear to push or pull the airplane with a tow bar.

An aft tow fitting can be installed on the main landing gear to pull or push the airplane with a tow bar.

NOTE: Before you can install a towbar onto the aft tow fitting, you must remove the aft tow fitting jack adapter.

You must be careful when you tow the airplane in a turn. Do not cause more than the Maximum Towing Loads.

Make sure you have the necessary clearance when you go near a parked airplane or other structures. When the APU in the towed airplane or a parked airplane is on, you must have a minimum clearance of 50.0 feet (15.24 meters). The clearance must be between the APU exhaust port and the adjacent airplane's wingtip (fuel vent).

To tow the airplane with the entry or the cargo doors open is optional.

Towing stability of a Towbarless Tow Vehicle (TLTV)/Airplane combination is dependent on many variables, two of these key variables being the characteristics of the tow vehicle tractive forces and the runway conditions. Maximum towing speeds shall be the responsibility of the airplane operator in conjunction with the airport authorities with consideration of recommendations from the TLTV manufacturer.

You can use towbarless equipment to push or pull the airplane.

For a fully loaded airplane, the minimum fuselage ground clearance is approximately 86 inches.

WARNING: WHEN YOU TOW THE AIRPLANE, ALL PERSONS MUST STAY OUT OF THE DANGEROUS AREAS AROUND THE TOW VEHICLE, TOW BAR, AND NOSE WHEELS. PERSONNEL ON THE GROUND MUST BE AWARE OF THE POSSIBILITY OF BEING RUN OVER BY THE NOSE WHEELS. THE TOW VEHICLE, TOW BAR, AND AIRPLANE WILL CHANGE POSITION DURING PUSHBACK AND TOWING. MAINTAIN A MINIMUM OF 10 FEET SEPARATION BETWEEN PERSONS ON THE GROUND AND THE EQUIPMENT THAT MOVES. A FATAL INJURY COULD OCCUR.

NOTE: You can tow the airplane when it has flat tires. Keep these operations to a minimum because flat tires can put too much load on the inflated tires.

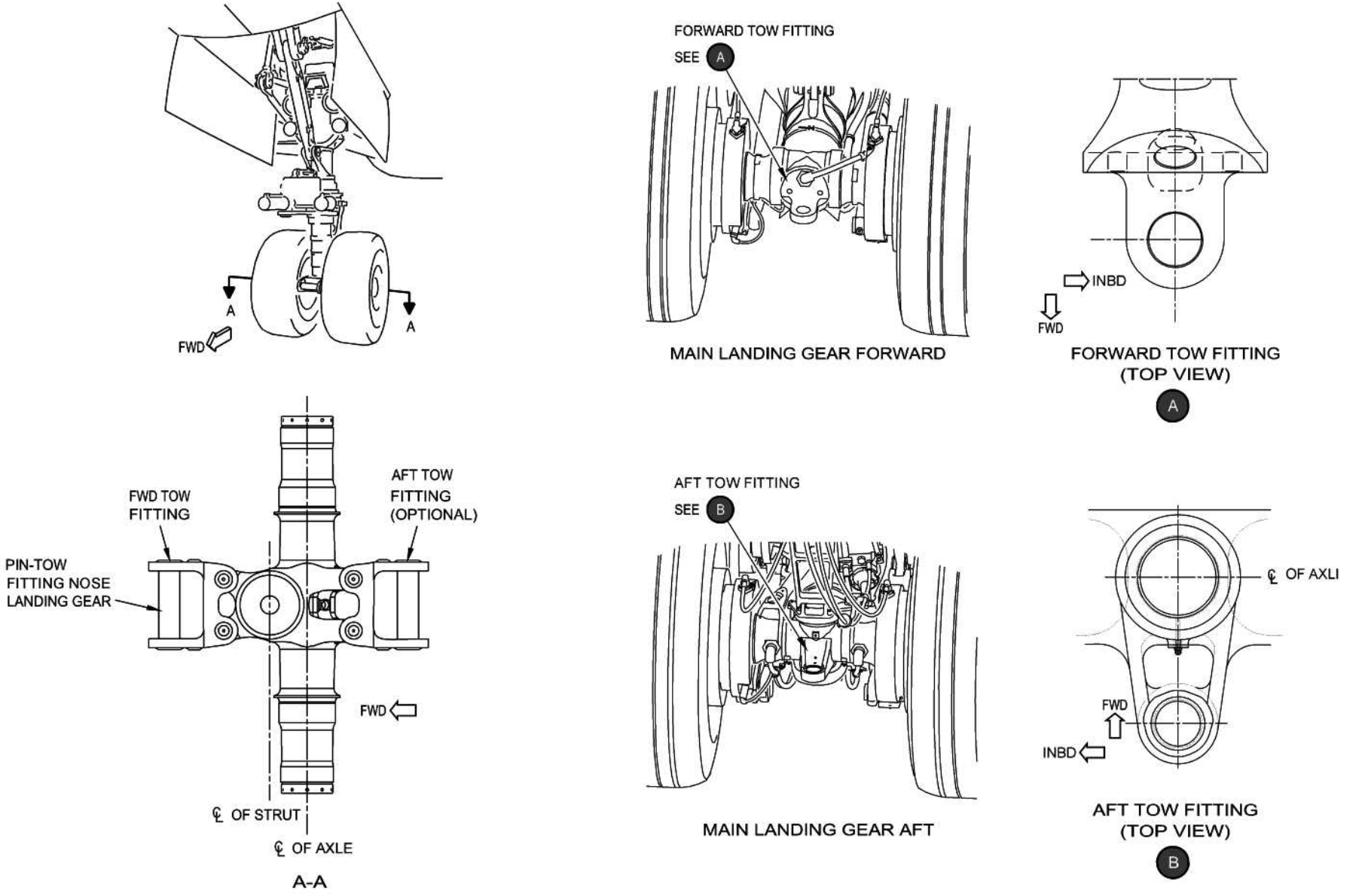


Figure 28 Airplane Towing

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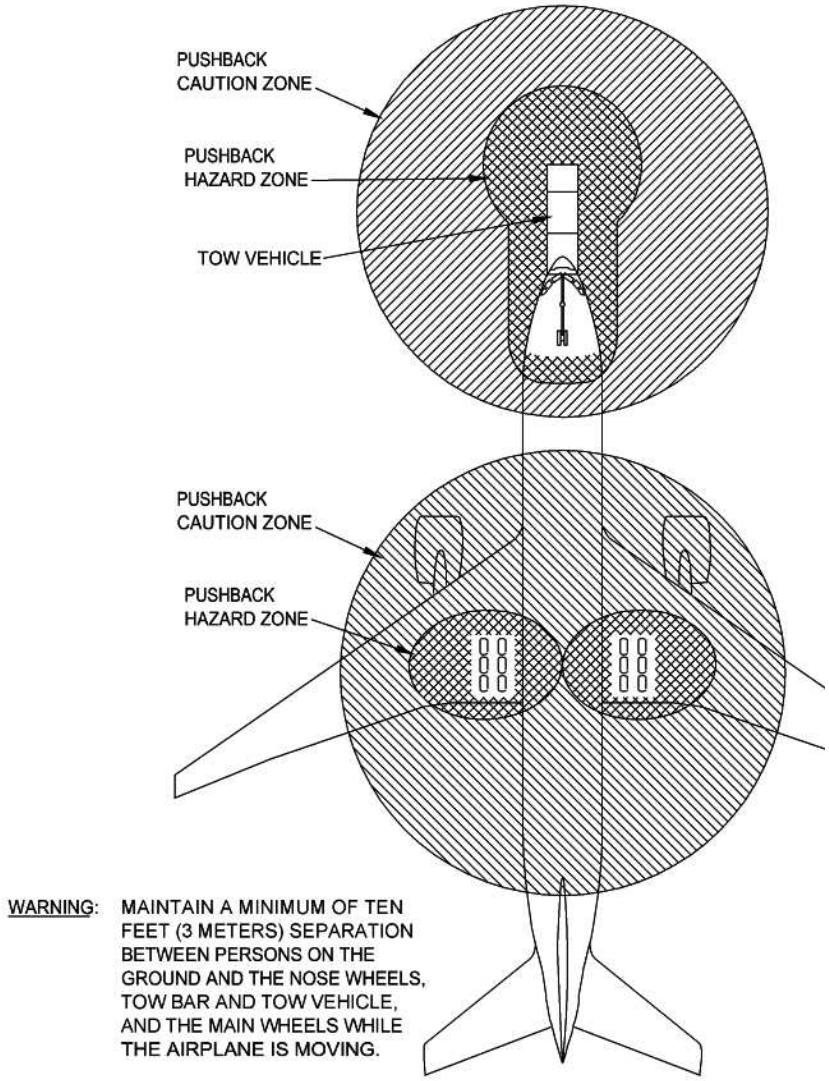
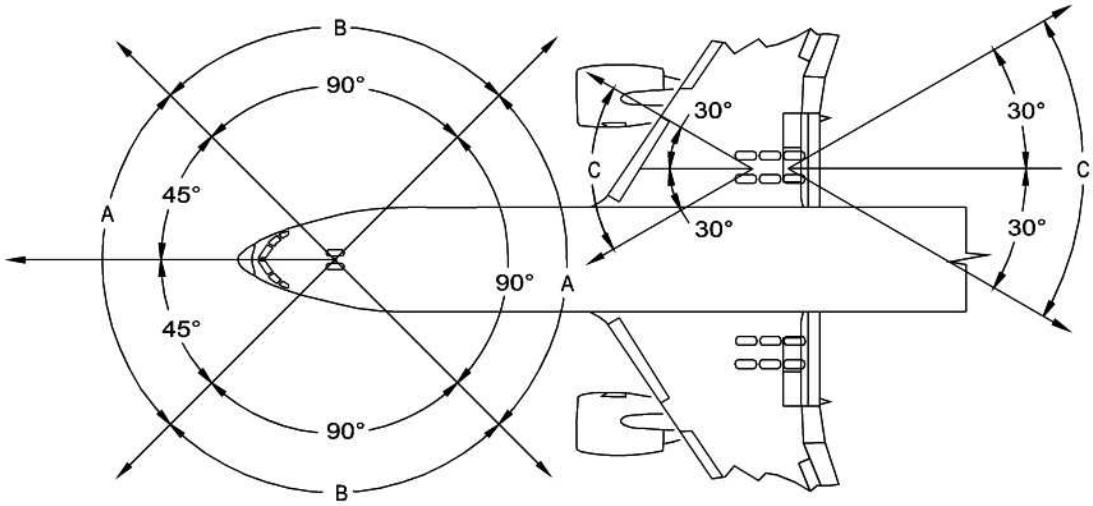


WARNING: MAINTAIN A MINIMUM OF TEN FEET (3 METERS) SEPARATION BETWEEN PERSONS ON THE GROUND AND THE NOSE WHEELS, TOW BAR AND TOW VEHICLE, AND THE MAIN WHEELS WHILE THE AIRPLANE IS MOVING.



MAXIMUM TOWING LOADS:

A = 95,000 LB (43091 KG)
B = 47,500 LB (21546 KG)
C = 75,000 LB (34019 KG)

NOTE: DISCONNECT THE NOSE GEAR TORSION LINK WHEN TOWING AT ANGLES MORE THAN 70° TO PREVENT DAMAGE TO THE HYDRAULIC STEERING SYSTEM.

Figure 29 Towing Hazard zones

ATA 10 PARKING AND MOORING

10–00 PARKING AND MOORING GENERAL

PARKING/MOORING GENERAL DESCRIPTION

Parking, mooring and storage instructions are provided to protect the aircraft from damage/deterioration while it is not in use.

Weather conditions and the length of time that the aircraft is parked are used to determine the level of precautions necessary. After the aircraft is taken out of storage, it is necessary to return the aircraft to a serviceable condition.

Parking and mooring the aircraft include the following functions:

- Parking/storage
- Mooring
- Return to service

Normal Parking

Normal Parking is when you park the airplane for less than 7 days.

WARNING: PITOT PROBE COVERS AND STATIC PORT COVERS ARE RECOMMENDED WHEN THE AIRPLANE IS PARKED FOR MORE THAN A STANDARD TURNAROUND OR WHEN CONDITIONS SUCH AS INSECT ACTIVITY, DUST STORMS OR VOLCANIC ASH MAY INCREASE THE RISK OF PITOT PROBE OR STATIC PORT CONTAMINATION. A PITOT PROBE OR STATIC PORT SYSTEM BLOCKED BY FOREIGN OBJECTS SUCH AS INSECTS MAY CAUSE LARGE ERRORS IN AIRSPEED–SENSING AND ALTITUDE–SENSING SIGNALS WHICH MAY LEAD TO LOSS OF SAFE FLIGHT, WHICH WILL CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

Prolonged Parking

When an airplane is not operated for 7 days or more, the airplane must be protected. The procedures that follow will prevent the deterioration of the airplane structure, finish, or system components. There are different procedures to prepare some systems for storage. These procedures are calculated by the length of time the airplane is to be in prolonged parking/storage. In addition, there is also a task to put the airplane back to a serviceable condition after it has been in prolonged parking/storage.

WARNING: WHEN THE STATIC PORTS/PITOT PROBES ARE COVERED, MAKE SURE THAT CONDITION IS VISIBLE FROM THE GROUND. IN ADDITION, ATTACH TAGS TO THE LEFT CONTROL WHEEL IN THE FLIGHT DECK AS REMINDERS THAT STATIC PORTS/PITOT PROBES ARE COVERED. FAILURE TO OBSERVE AND REMOVE COVERINGS OVER STATIC PORTS/PITOT PROBES BEFORE FLIGHT MAY CAUSE LARGE ERRORS IN AIRSPEED–SENSING AND ALTITUDE–SENSING SIGNALS, WHICH MAY LEAD TO LOSS OF SAFE FLIGHT.

Return to Service

It is necessary to prepare the aircraft for operation when the aircraft has been stored for an extended time. This includes the cleaning, lubrication, visual checks and operational tests necessary to put the aircraft in a serviceable condition.

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ATA 12 SERVICING

12–00 SERVICING GENERAL

INTRODUCTION

This chapter contains data and procedures for the servicing tasks to be carried out during normal operations. This chapter is divided into sections as follows:

- Replenishing (12–10–00)
- Scheduled servicing (12–20–00)
- Unscheduled servicing (12–30–00)

Description

- Replenishing the aircraft includes the resupply of materials and fluids required for the normal operation of the following aircraft systems and components:
  - Servicing the fuel system (12–11–00)
  - Servicing the hydraulic system (12–12–00)
  - Servicing the oil systems (12–13–00)
  - Servicing the water systems (12–14–00)
  - Servicing the gaseous systems (12–15–00)
  - Servicing the windows (12–16–00)
  - Servicing the lavatory systems (12–17–00)
- The scheduled servicing data and procedures are found in the following sections:
  - Airplane lubrication (12–21–00)
  - Oil change (12–22–00)
  - Cleaning and washing (12–25–00)
- The unscheduled servicing data and procedures are found in the following sections:
  - Cold weather protection (12–33–00)

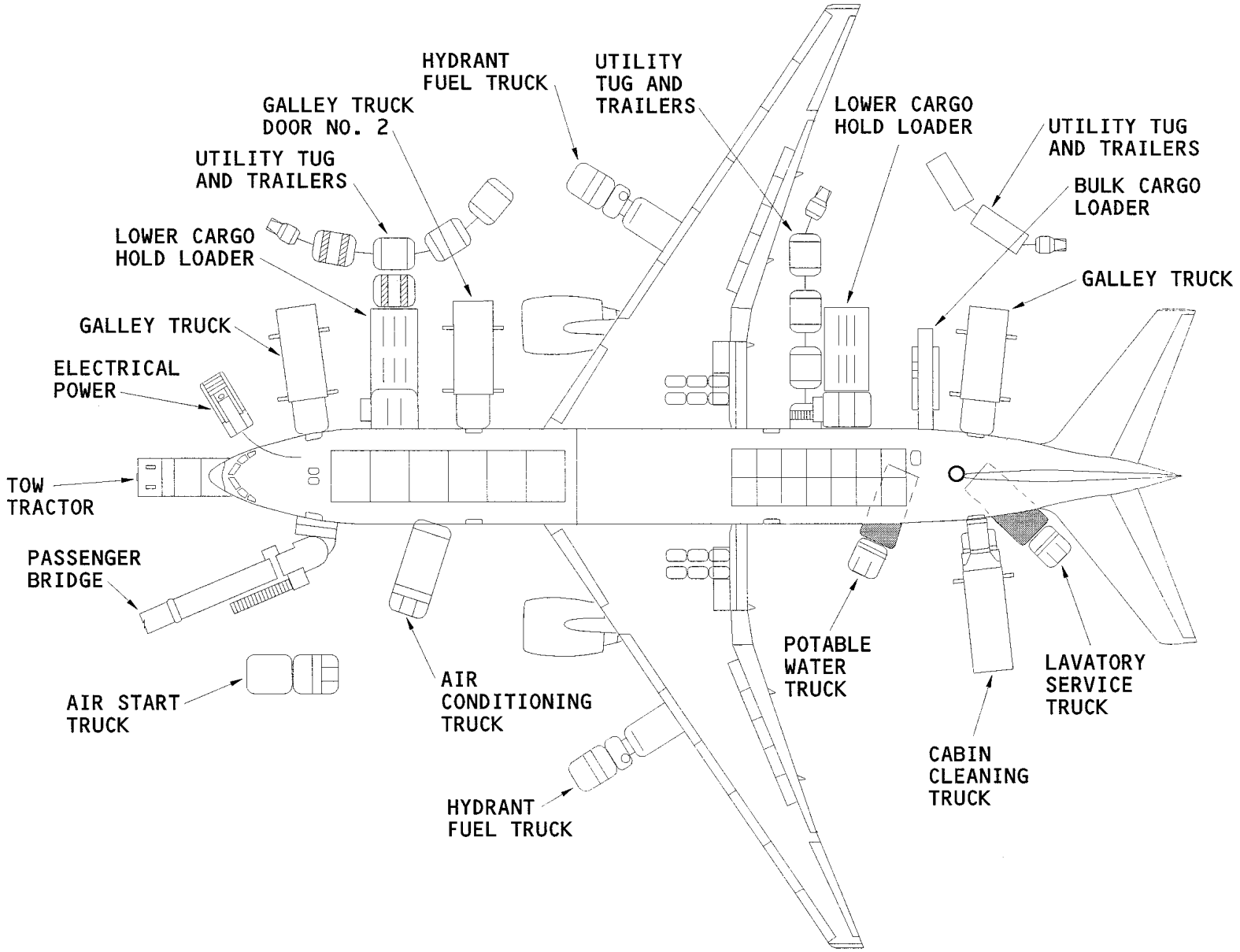


Figure 30 Airplane Servicing

ATA 20 AIRFRAME STANDARD PRACTICES

20–00 AIRFRAME STANDARD PRACTICES GENERAL

GENERAL

This chapter contains information and instructions for the standard practices that are applicable to the airframe. The standard practices are the usual maintenance tasks that are specified regularly in the different maintenance procedures in the manual. To keep space to a minimum, standard practices tasks are not written every time they are part of a maintenance procedure. When a standard practice is part of a maintenance procedure, a reference is made to the applicable task in this chapter.

The airframe standard practices include the sections that follow:

- Standard Practices (20–10–00)
- Standard Torque Values (20–11–00)
- Data Loading (20–15–00)
- Inspection/Check (20–20–00)
- Specifications and Materials (20–30–00)
- Airplane Grounding (20–41–00)
- Electrical and Electronics Safety Equipment (20–60–00)

Electrostatic Discharge Safety Precautions

Many electronic line replaceable units (LRUs) contain micro-circuits and other devices that electrostatic discharges can damage. These LRUs are **E**lectro**s**tatic **D**ischarge **S**ensitive (ESDS). There are placards on ESDS LRUs.

There are precautions that you must take when you touch ESDS LRUs. Some precautions apply only to ESDS printed circuit boards, and some precautions apply only to ESDS metal encased units.

ESDS Printed Circuit Boards

On the outer area of card files, there are placards that show which boards are ESDS printed circuit boards.

You must use a wrist strap when you touch one of the ESDS boards. The wrist strap is on the plenum between the El and E2 racks. Connect the wrist strap into an electrostatic ground jack. There are placards that show the jack Locations.

Use the extractors on the card to remove it. Put the card in an ESDS conductive bag, and close the bag with ESDS or 100 percent cotton twine.

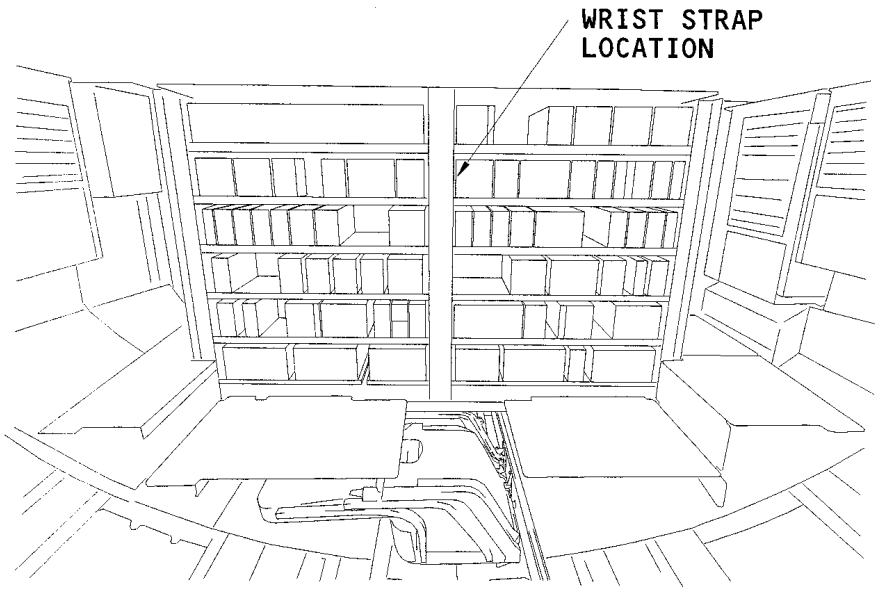
ESDS Metal Encased Units

On the equipment racks, there are ESDS placards and placards that show the procedure for the removal and installation of ESDS metal encased units.

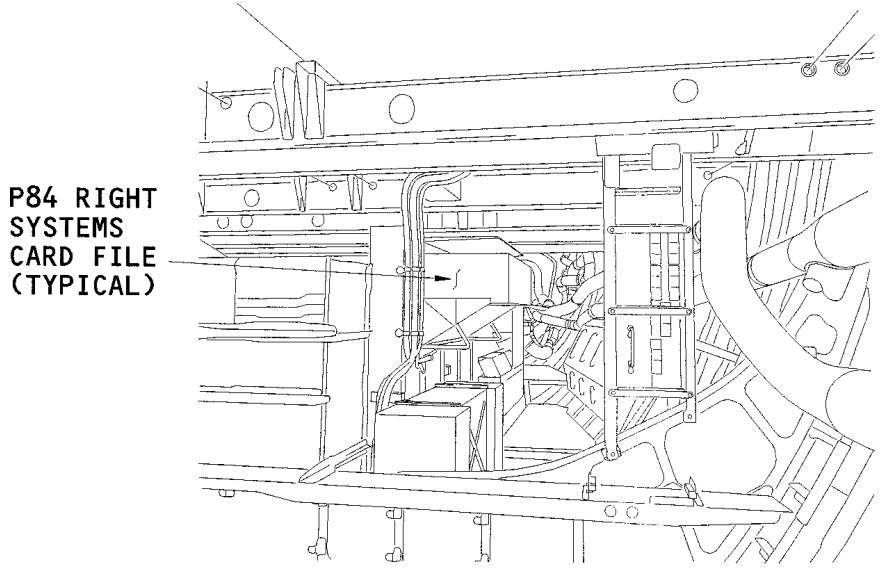
NOTE: When you remove a unit, do not touch the pins in the electrical connectors. Install a conductive dust cover on the connectors.

NOTE: THE CONDUCTIVE DUST CAPS AND THE CONNECTOR COVERS ARE BLACK.

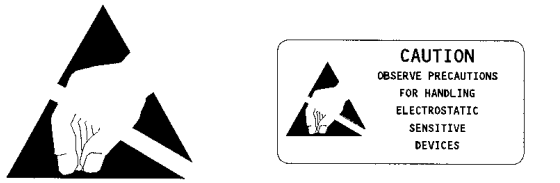
NOTE: YOU CAN USE THE CONDUCTIVE DUST CAPS AND THE CONNECTOR COVERS FROM THE UNIT YOU INSTALL ON THE UNIT YOU REMOVE.



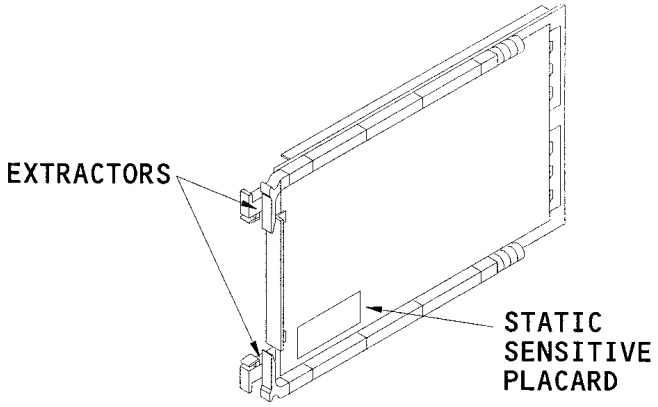
E1 AND E2 RACKS
(LOOKING AFT)



MAIN EQUIPMENT CENTER
(LOOKING FORWARD)



ESDS SYMBOL AND PLACARD (TYPICAL)



ESDS PRINTED CIRCUIT
BOARD (TYPICAL)

Figure 31 ESDS Device Handling

ATA 23 DATA BUSES

23–00 DATA BUSES GENERAL

GENERAL

General

The 777 line replaceable units (LRUs) and line replaceable modules (LRMs) use different data buses. An LRU/LRM may use one or more of these types of data buses:

- ARINC 629
- ARINC 429
- ARINC 453
- ARINC 717
- ARINC 618
- RS-422
- RS-232
- 10 base T
- RS-485
- 10 base 2
- ARINC 636.

LRUs/LRMs send data to their data buses at different speeds.

ARINC 629

The ARINC 629 data bus is an unshielded, twisted pair of wires continuously bonded and terminated at both ends. Many LRU/LRMs connect to an ARINC 629 data bus with current mode couplers. The LRU/LRMs send data to the ARINC 629 data bus one at a time. All connected LRU/LRMs can receive data from the ARINC 629 data bus at the same time. Some LRU/LRMs only receive ARINC 629 data.

ARINC 429, 453, 717, 618, and RS-422

The ARINC 429, 453, 717, 618, and RS-422 data buses are one-way buses that send data on a twisted, shielded pair of wires.

Each bus has only one transmitter that sends data to one or more receivers.

RS-232

The RS-232 data bus is a one-way bus that sends data on a coaxial wire.

10 Base T

The 10 base T data bus is a two-way bus that sends data on two twisted, shielded pairs of wires. One pair transmits and the other pair receives signals. The 10 base T bus operates between two LRU/LRMs only.

RS-485

The RS-485 data bus is a two-way bus that sends data on a twisted, shielded pair of wires. The RS-485 bus operates between two LRU/LRMs only.

10 Base 2

The 10 base 2 data bus is a two-way bus that uses a single coaxial wire connected to each LRU/LRM on the bus. The operation of the bus is similar to ARINC 629 but the LRU/LRMs connect to the 10 base 2 bus internally.

ARINC 636

The ARINC 636 is a fiber optic data bus. One strand of optical fiber per bus. Two strands of optical fiber provide a primary (PRI) and secondary (SEC) bus.

The ARINC 636 fiber optic data bus connects to many LRU/LRMs. LRU/LRMs send and receive data in series on the ARINC 636 fiber optic data bus.

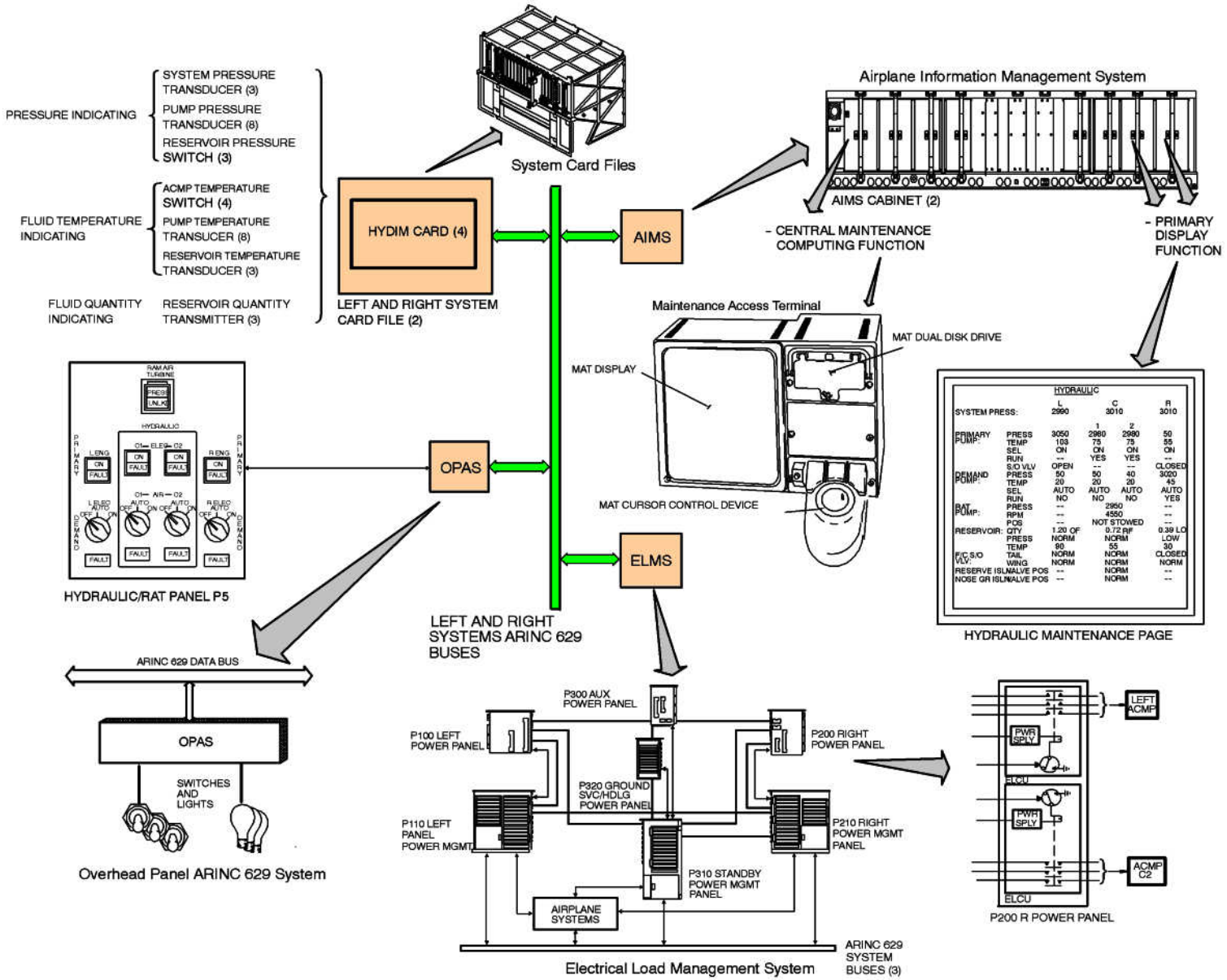


Figure 32 ARINC 629 - Interface

ARINC 629 – GENERAL LAYOUT

General

An ARINC 629 data bus is an electronic data movement system that connects many line replaceable units (LRUs) in a single communication loop. Data from any ARINC 629 LRU is available to all other LRUs on the same ARINC 629 bus.

Communication on an ARINC 629 data bus is bidirectional; data to and from the LRUs moves on the same bus.

The ARINC 629 bus permits greater volume and speed of data movement than other data buses now in use. There are eleven ARINC 629 data buses in the 777 airplane.

An ARINC 629 data bus is a twisted pair of wires with termination resistors at each end. As many as 120 LRUs can use one ARINC 629 data bus. In 777 airplanes the maximum number of current-mode couplers per bus is 46.

Components

The ARINC 629 data bus system has these parts:

- Data bus cable
- Current-mode couplers
- Stub cables.

The ARINC 629 system also includes these components in the LRUs:

- Serial interface modules
- Terminal controllers.

Characteristics

The ARINC 629 data bus system has these characteristics:

- The LRUs send data one at a time in sequence
- The LRUs receive data at the same time
- Communication on ARINC 629 is bi-directional; LRUs may transmit and receive data on the same bus
- One LRU may connect to more than one data bus through separate couplers on each bus
- All data on the bus is available to all the LRUs on that bus.

ARINC 629 Data Bus Configuration

These are the eleven ARINC 629 data buses:

- Three flight control buses
- Four system buses
- Four airplane information management systems (AIMS) intercabinet buses.

The flight control buses connect LRUs that have flight control functions.

The system buses connect LRUs that have airplane system functions. These buses work independently from the flight control buses. The systems buses move data between these five areas:

- Avionics
- Propulsion
- Electrical
- Electro-mechanical
- Environmental control.

Four AIMS intercabinet buses move data between the two AIMS cabinets and the three control display units (CDUs).

Functional Description

Each LRU uses one or more current mode couplers to connect to data buses.

A current mode coupler and its terminal (terminal controller and serial interface module) move data to and from the bus. Only one terminal on a bus transmits at a time. Each terminal listens to the bus and waits for a stop in data movement on the bus from other LRUs before it transmits.

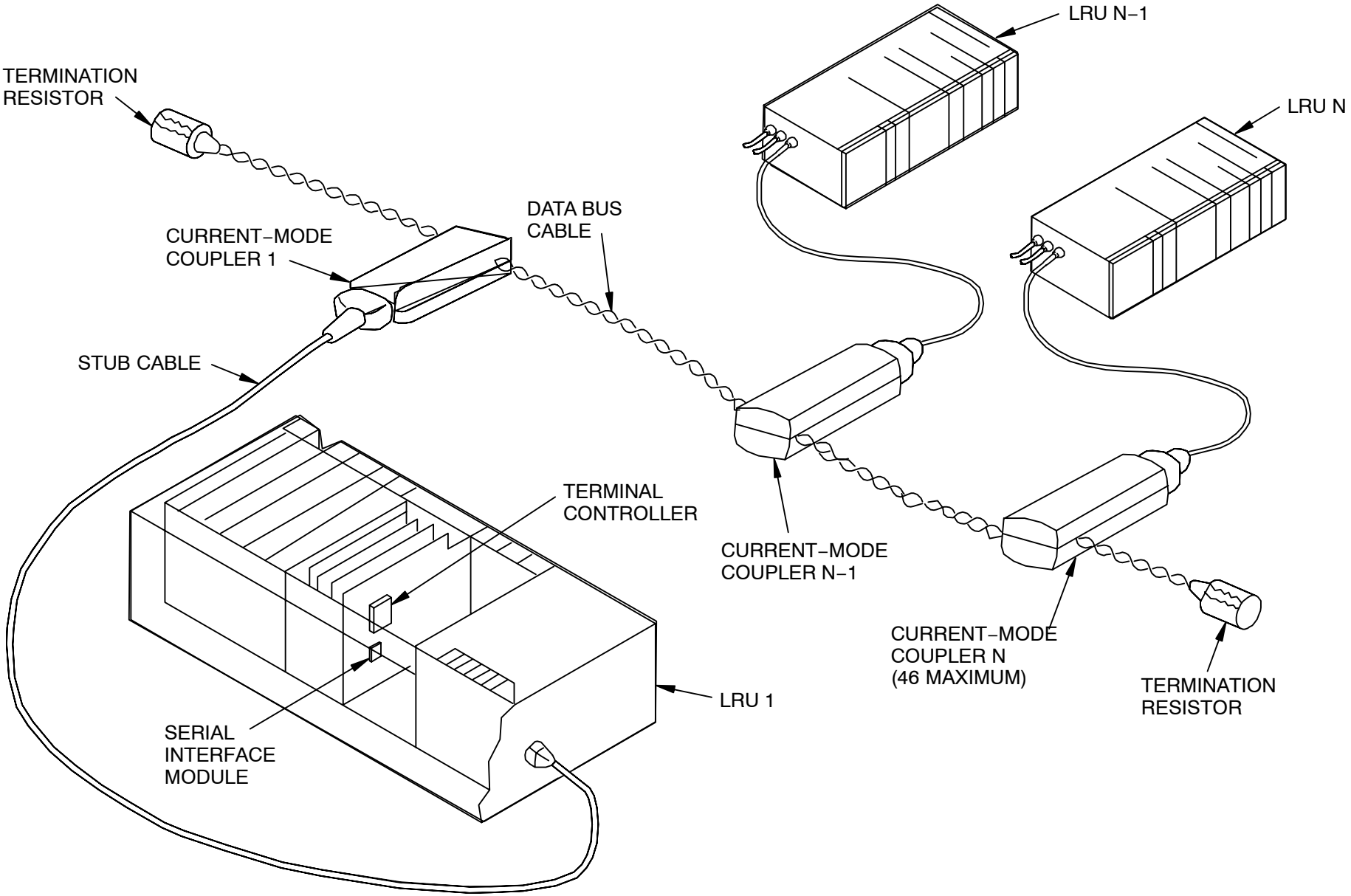


Figure 33 ARINC 629 General Layout

OVERHEAD PANEL ARINC 629 SYSTEM - GENERAL LAYOUT

General

The overhead panel ARINC 629 system (OPAS) sends flight deck switch position data to the ARINC 629 systems buses. It also gets data from the ARINC 629 systems buses to turn on and off some flight deck panel lights.

The OPAS helps decrease the weight of the airplane. It uses less wires than direct connections between these units:

- Switches
- Lights
- Line replaceable units (LRUs)
- Line replaceable modules (LRMs).

General

The OPAS moves flight deck switch and light data through the overhead panel card files (OPCFs) and panel data concentrator units (PDCUs).

The overhead panel bus controllers (OPBCs) are the interface units for the ARINC 629 buses.

Components

The OPAS has these six components:

- Left and right OPCFs
- Left and right PDCUs
- Left and right OPBCs.

Operation

These are the functions of OPAS:

- It sends flight deck switch position data to the systems ARINC 629 buses
- It gets data from the systems ARINC 629 buses to turn some flight deck panel lights on and off
- It reports system faults to the central maintenance computer system (CMCS)
- It reports OPAS failures to the flight crew by an EICAS status message.

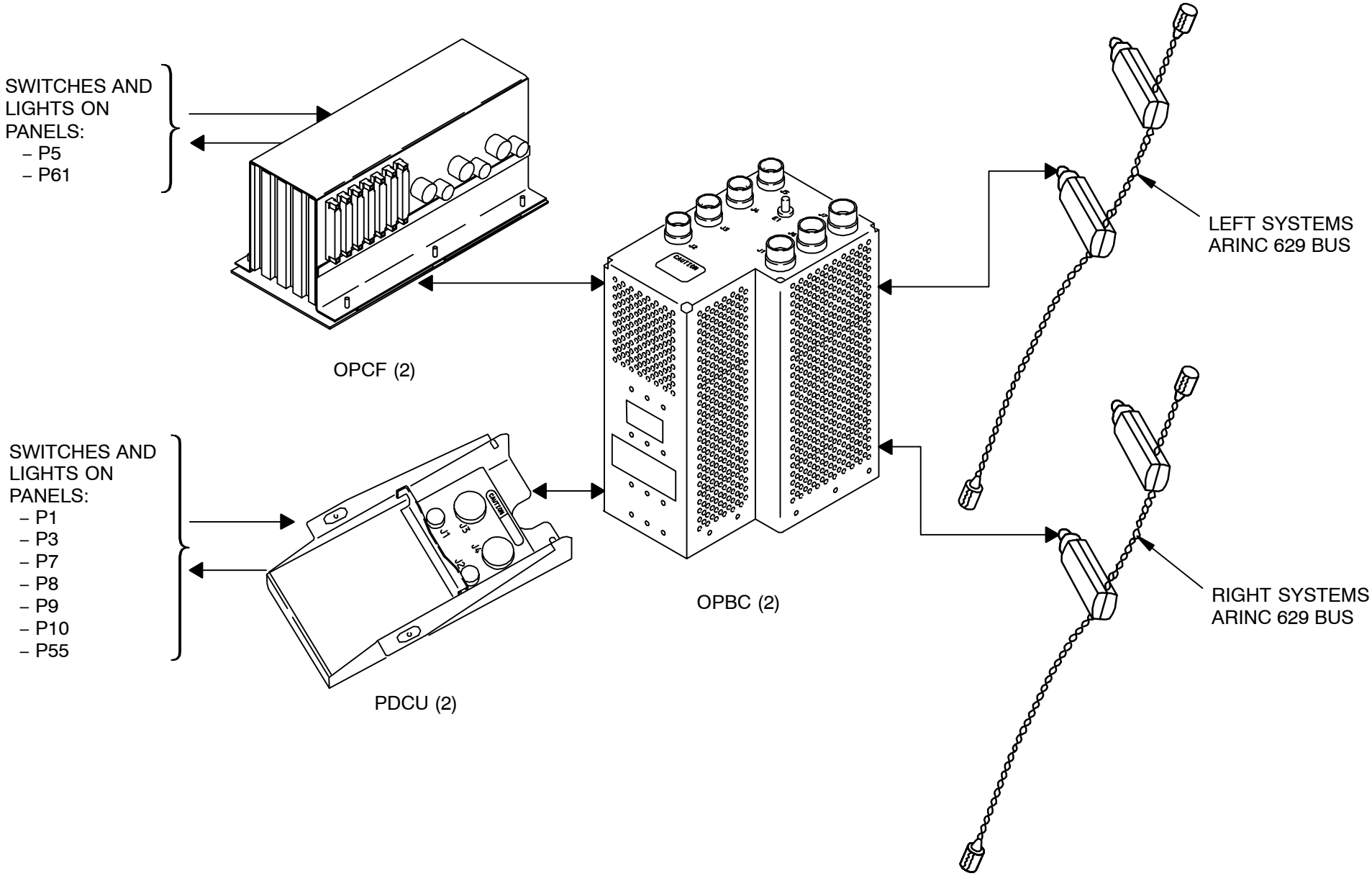


Figure 34 OPAS General Layout

ONBOARD LOCAL AREA NETWORK - GENERAL LAYOUT

Purpose

The onboard Local area network (OLAN) is a fiber optic communications network. It moves digital data between line replaceable units (LRUs). Fiber optic networks have these qualities:

- They carry more data than wire buses
- They weigh less than wire buses
- Electromagnetic radiation has no effect on the data.

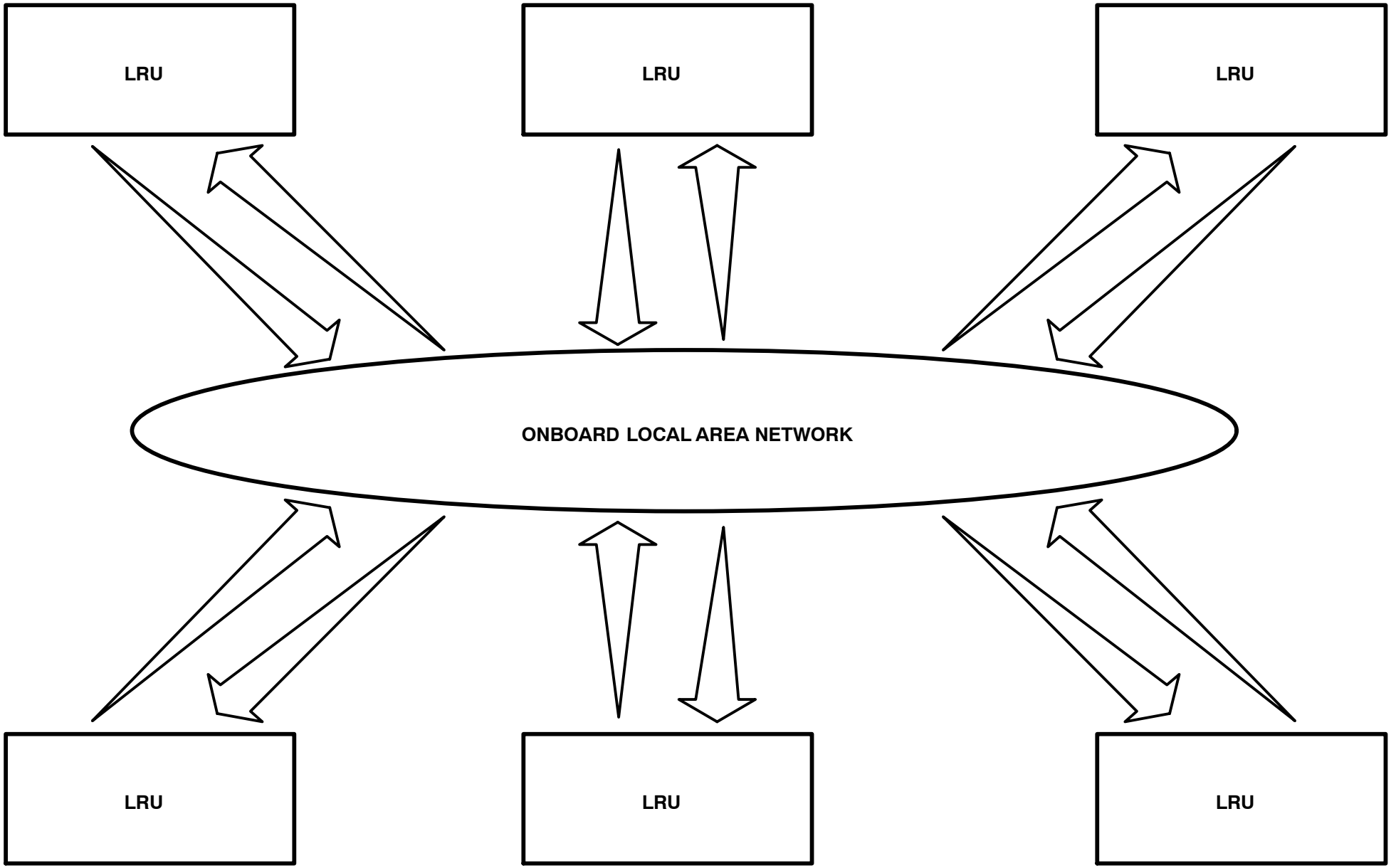


Figure 35 Onboard Local Area Network General Layout

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